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PUBLISHED TWICE MONTHLY

PLAY METER

AUGUST 1, 1983

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PLAY METER

Twice a Month Publication for the Coin Operated Entertainment Industry

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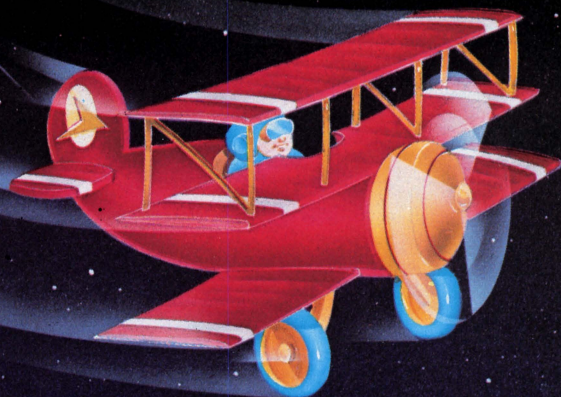
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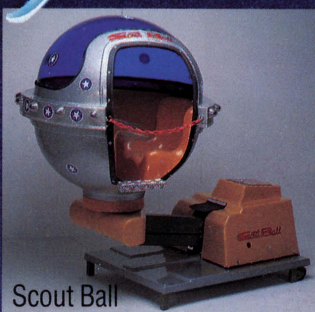
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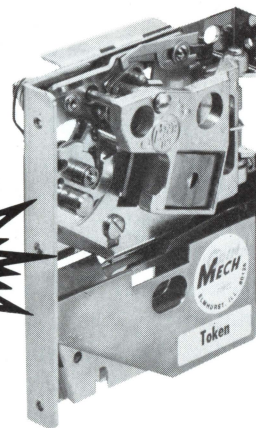
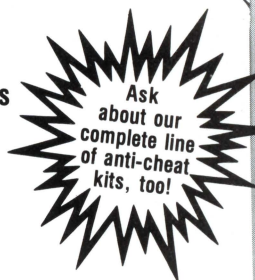
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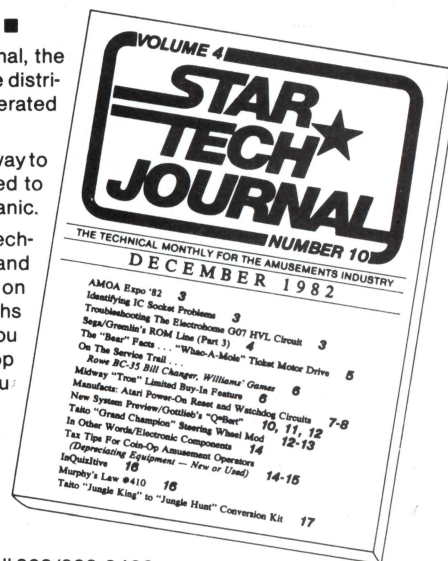
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UP FRONT

SERVICE CAN MAKE OR BREAK A BUSINESS

If you were to ask an operator if he is satisfied with his business and he answered "yes," you would probably assume he has a viable operation that will survive the sands of time.

Maybe he does. But one operator contends that if you are satisfied, then you may be on the road to self-destruction.

Once you are satisfied and feel comfortable and secure, you lose motivation to strive to do better. You need that motivation to improve and to achieve your goals, including your service goals.

Operators willing to compromise themselves by offering higher commission splits to locations have to cut back somewhere. And sadly, that somewhere is too many times the service.

This industry is service oriented. Service, defined by Webster, is "a facility providing maintenance and repair," and "work performed by one who serves." Serve, according to Webster, is "to stand by; to be a servant; and to comply with the demands of."

It sounds serious to profess being service oriented. It should. Service, or lack of it, can make or break a business. Compare our industry to the automobile industry. Many dealerships sell the same models, yet some are very successful and some are not. No matter how competent and honest your salesmen are, they will only sell that first game to a customer; the service sells the rest. The equipment is the same—the service is unique. You wouldn't buy a car from a dealer that lied to you or had you fight to get what you were promised.

Haven't you wondered why one operator seems to have a thriving business with locations actually calling on him, when you are out hustling to solicit locations? That operator may even be on a 60/40 split instead of

the 50/50 you may be on. He may be offering something better than what you offer or something you don't offer at all—service.

Service is that edge you can have over your competitors. If your customers know that you are dependable, they are your best advertisement. Sure, it's extra work maintaining equipment, cleaning it periodically, and making sure it is in the best condition possible. But that extra work is your reputation.

A location once called an operator who had a good reputation and asked him to place some equipment in his location. When the operator met with the owner, he noticed the location had some very good machines. As the operator questioned the location owner, he found that the location was on a 50/50 split with the other operator.

"I want you to understand that I work only on a 60/40 split with a guaranteed minimum," the operator pointed out.

"Look, I don't care if it is 70/30," the location owner said. "I am not making anything because these games are out of order more than they are operable. And I heard that you service your equipment promptly."

That operator went on to obtain a very lucrative location. He did not undercut the previous operator though he could grumble that the competition stole his location. Actually, he gave the location away.

So, by now you have gotten the moral of the story. The equipment is the same. The service is special. It may cost you more to be on 24-hour service call and send a repairman out at 2 a.m. But it may cost you much, much more if you don't offer your customers more than just machines.

Valerie Cognevich

Valerie Cognevich
Executive Editor



Pinball parts

With the video light growing dimmer, I have been looking once again to pinball as a stronger, more consistent earner.

Pinball games appeal to a different target audience and have been performing remarkably well in appropriate locations.

Of course, more pins on the route mean more service, maintenance, and parts to stock. Imagine my surprise when I saw that a Williams' end of stroke switch now costs about \$4.

My distributor informed me that Williams doubled all of its pinball parts prices within the last year. Williams contends it was losing money selling at the old prices and had to raise them. I find this hard to believe.

Gottlieb didn't increase any parts prices from 1978 until 1982. Four years—even in the wake of rampant inflation! The other manufacturers have managed to keep their pricing somewhat reasonable also.

The cost of Williams' replacement parts discourages preventive maintenance so vital to pingames. Your ill-timed policy will not help pinball make the comeback it deserves.

Evan R. Wessel
Mercury Amusement Co.
Havertown, Pennsylvania

(Editor's note: Here is Williams' reply to Evan Wessel's letter.)

We at Williams certainly agree that non-video games, especially pinball, have a most definite place in our market. We have had tremendous response to our *Big Strike Shuffle Alley* and our *Time Fantasy* pinball.

We further agree that now is no time to discourage preventive maintenance on non-video games. Based on your letter, an analysis was made of 90 spare parts selected at random to verify our parts pricing. In addition to that, 40 of the most currently used parts were also analyzed. Based on this analysis, we can factually say our parts pricing is in line with our competitors'.

Over a year ago there was a change in policy which reflected an overall decrease in parts pricing by Williams.

We appreciate your letter and will

continue to be on the watch for parts mispricing.

Joseph P. Dillon
Vice President of Sales
Williams Electronics
Chicago, Illinois

Home games editorial

I have just reread Mr. Boasberg's guest editorial (See *Play Meter*, May 1,



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p. 8.) for the third time, and all I can do is shake my head from side to side in amazement and no little anger. Mr. Boasberg seems to me to be talking down to his fellow operators and distributors as people unable to think for ourselves about a real problem that faces us, namely the home video game.

His comparison of our problem to "TV vs. the movies" is slightly erroneous, in that it does not fully explore the whole picture. (No pun implied.) TV, cable, and HBO, I agree, have not killed the new exciting movies like "E.T.," "Tootsie," "The Verdict," etc. Using the few hit movies as an example is like comparing *Ms. Pac-Man* with a bad game. Who does not remember the vast number of theaters that went out of existence? You can safely wager that theater owners did not welcome TV with open arms.

I do agree with Mr. Boasberg that there is nothing like playing a real live video game in an arcade or location. We actually become the showroom for the manufacturers. However, the manufacturers have got to consider the consequences of their shortsighted policy of flooding the market with home video games at the very same time they are selling to the distributor, operator, and arcade people.

If we don't survive, they will no longer have their local showrooms. I was dumbfounded a short while ago when on my TV screen came Atari's commercial advertising the home video *Pole Position*, and I had not yet received my coin-operated sit-down model.

The home video player, with all of his practice on the current game, plays for a longer period of time than the average player. We are therefore taking in less quarters per hour, and it is killing a current game.

I can't remain silent when I read something that is threatening our business, namely complacency, or worse, welcoming our worst competitors as business companions. If we all think like this, we have nothing to fear but Chapter 11.

I think the manufacturers owe us something. There should be a reasonable lag time between a current game and the same game for home video. We certainly need exclusive time to try to get our largest cost factors back.

I think if enough of us make our feelings felt, we can make a difference, a la the *Pac-Man* speed-up kits.

Samuel Gaffin
Manager

Marty's Playland
Ocean City, Maryland

PLAY METER, August 1, 1983

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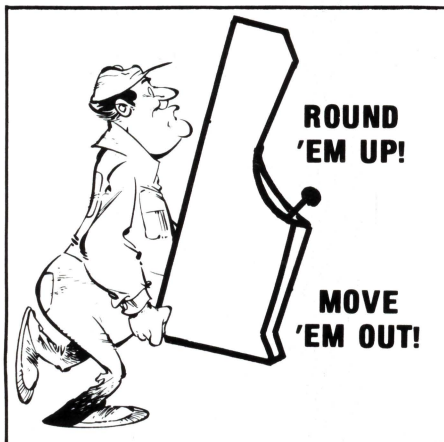
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NEWS

BY
**Mike
Shaw**

MARSHFIELD VIDEO GAME BAN UPHELD • BAN AUTHOR CRITIQUES INDUSTRY • GRAY AREA MANUFACTURERS ARRESTED • DORIS STEPS DOWN • CALIFORNIA TAX AMENDED • FLORIDA OPS UNSCATHED • 'CUTE-SEE' GETS SPLIT DECISION • NEXT THREAT: LOTTERY VIDEOS • ARCADES MUST DEAL WITH COMPLAINTS • MISSISSIPPI OPERATORS ORGANIZE • DEVASTATING TOWN FEES

MARSHFIELD VIDEO GAME BAN UPHELD



The highly publicized Marshfield ban on commercial video games has been upheld by the Massachusetts Supreme Court.

The ruling will cause the removal of about 70 video games in the south shore resort community. Previously, the ruling had been upheld by the state attorney general, the Plymouth County Superior Court, and the state Appeals Court. The Marshfield bylaw had been vigorously opposed by nine video game locations supported by the Coin Machine Industries Association of New England and veteran coin-op industry attorneys.

The town voted 191 to 19 in June 1982 to prohibit local businesses from having video games and re-enforced its support of that decision at a town meeting this May when a chorus of more than 500 residents shouted "nay" to a proposal to lift the ban for bars and restaurants.

The battle over the ban was viewed as an extremely important test for the industry. As industry officials awaited the Supreme Court's decision, they predicted a victory for Marshfield could mean another 300 cities nationwide will impose similar restrictions on videos.

"It could ruin an industry that employs 400,000 Americans," said Barry Rosenthal, an industry lawyer in the case.

"This issue is tougher than Mesquite," said Ira Zaleznik, Rosenthal's law partner, "because here we're talking censorship." (*Play Meter*, May 15, p. 14, *City of Mesquite v. Aladdin's Castle, Inc.*)

In a sweeping decision against the video game industry, Justice C. J. Hennessey, writing the court's decision, denied all three industry contentions.

To the merchants' objection that the Marshfield ban was inconsistent with state law prohibiting a total ban on a legitimate business, the court replied, "It is clear that in some areas of activity legal business activities regulated by state law may be prohibited by local bylaws."

Another industry objection centered around constitutionally guaranteed freedoms, "fundamental rights of freedom of expression guaranteed under both the State and Federal Constitutions."

But the court replied that it was "not prepared in this case...to hold that these video games, which are, in essence, only technologically advanced pinball machines, are entitled to constitutional protection."

It was the second time in a few months that the Massachusetts court denied First Amendment rights to video games, having ruled similarly in *Caswell v. Licensing Commission for*

Brockton (*Play Meter*, March 15, p. 19).

In denying the industry's third and final objection to the Marshfield law, the court ruled a city could single out a particular industry to legislate against, despite its established legitimacy under the state law.

"Even a legitimate occupation may be restricted or prohibited in the public interest," the court said, calling on an earlier Massachusetts ruling.

"It would be reasonable for a town to prohibit the commercial operation of these games to further the legitimate objectives of decreasing noise, traffic, and congestion in the areas of the business operating the games."

The ruling, issued June 13, takes effect July 11. As of that date, there will be no commercial video games on location in Marshfield, the ban's originator, Thomas Jackson, assured *Play Meter*.

Industry attorneys said they did not want to "let the decision lie" and suggested they might appeal the decision to the U.S. Supreme Court. •

BAN AUTHOR CRITIQUES INDUSTRY

The organizer of the Marshfield, Massachusetts, ban on commercially operated video games said he led the fight to rid the town of the games because the people in the video games business in his area "are all hoods."

Thomas Jackson, a former Massachusetts narcotics officer and head of

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NEWS

the Marshfield Vandalism Committee, told *Play Meter* that video game locations in Marshfield were places where drug trafficking was suspected.

"I don't want my children supervised by those kind of people," Jackson said.

He said the leading proponent in Marshfield to ease restrictions on the games so that they could be installed

in bars and restaurants had been arrested in a recent drug raid.

Jackson was not any less critical of the manufacturers of video games.

"They're making tons of money and should be putting some of it back into making the places better for kids," he said. "Instead, they have only been concerned about making as much money as they can, as fast as they can,

without any concern for their real customers, the children."

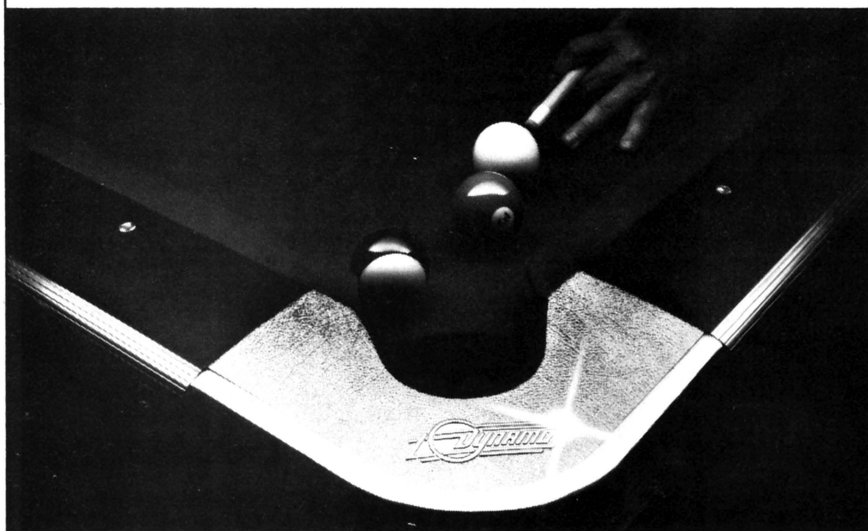
Eighty-nine percent of the games are violent and "designed to be addictive," Jackson claimed, and he could only see bad results emanating from them. He claimed there were nine documented deaths due to violence in arcades in 1982 in the U.S. and claimed that locally, children were stealing to get money to play the games.

Jackson said that when he began his effort to have the games banned from Marshfield, he got no help from the city's police chief because there had not been any police problems related to the games. But, Jackson said, "I would much rather prevent crime before it happens."

Jackson said Marshfield's ban could affect the way other cities in New England regulate videos.

"Joanne Prevost (Boston Consumer Affairs Commissioner) told me she would have done the same thing in Boston had she not feared that a ban there would not hold up in court," he said.

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GRAY AREA MANUFACTURERS ARRESTED



The Connecticut state police have arrested two "gray area" video game manufacturers and charged them with making, leasing, and possessing gambling machines.

Arrest warrants for Irving Yaffa (AKA Irving Jeffries) of Status Game and Dominic Sanzo of Game-A-Tron

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Play Meter's Equipment Poll

TOP VIDEOS Arcade Locations

Sixteen of 28 videos (57%) with a response rate over ten percent have above average performances.

	Rating		
	Aug. 1	July 15	July 1
1. Pole Position/Atari	100.0	100.0	100.0
★ 2. Star Trek/Sega	78.0	80.1	76.4
★ 3. Sinistar/Williams	76.3	69.7	78.5
★ 4. Time Pilot/Centuri	70.7	65.8	66.1
★ 5. Turbo/Sega	69.5	—	—
★ 6. Millipede/Atari	67.0	65.2	63.7
★ 7. Xevious/Atari	64.3	61.2	68.7
8. Q*bert/Gottlieb	62.0	59.3	65.4

Provisionally Rated Videos (Above average performing games, with a response rate between 10—25%)

	Rating		
	Aug. 1	July 15	July 1
Provisional Ratings			
Gyruss/Centuri	80.1	—	—
Zoo Keeper/Taito	77.4	63.5	71.0
Bubbles/Williams	68.6	71.3	—
Mappy/Bally	67.7	67.8	70.4
Food Fight/Atari	65.8	72.5	68.7
Bagman/Stern	62.9	63.0	—
Congo Bongo/Sega	62.7	77.9	81.6
Mad Planets/Gottlieb	61.7	58.2	62.2

TOP PINBALLS Arcade & Street Locations

Eight of 17 pinballs (47%) with a response rate over ten percent have above average performances.

	Rating		
	Aug. 1	July 15	July 1
★ 1. Grand Slam/Bally	100.0	—	89.3
2. Q*bert's Quest/Gottlieb	90.3	58.1	100.0
★ 3. Soccer King/Zaccaria	83.3	—	—
4. Eight Ball Deluxe/Bally	82.0	59.3	81.4
5. Joust/Williams	76.4	62.5	126.0
★ 6. Pinball Champ/Zaccaria	76.4	—	—

Provisionally Rated Pinballs (Above average performing games, with a response rate between 10—25%)

	Rating		
	Aug. 1	July 15	July 1
Provisional Ratings			
Super Orbit/Gottlieb	129.6	56.8	—
Royal Flush Deluxe/Gottlieb	111.1	—	—

TOP VIDEOS Street Locations

Fourteen of 23 videos (61%) with a response rate over ten percent have above average performances.

	Rating		
	Aug. 1	July 15	July 1
★ 1. Pole Position/Atari	100.0	100.0	100.0
★ 2. Time Pilot/Centuri	68.4	67.8	67.5
★ 3. Q*bert/Gottlieb	66.2	61.7	62.2
★ 4. Millipede/Atari	63.5	59.8	60.7
5. Ms. Pac-Man/Bally	62.8	62.2	57.9
6. Mr. Do!/Universal	62.3	58.4	67.2

Provisionally Rated Videos (Above average performing games, with a response rate between 10—25%)

	Rating		
	Aug. 1	July 15	July 1
Provisional Ratings			
Mappy/Bally	82.0	74.2	—
Zoo Keeper/Taito	77.4	79.0	—
Bubbles/Williams	70.3	80.5	—
Bump 'n' Jump/Data East/Bally	67.1	—	—
Xevious/Atari	67.1	—	76.5
Front Line/Taito	65.0	58.6	72.7
Bagman/Stern	64.6	67.1	—
Sinistar/Williams	61.5	76.3	66.9

NOVELTY (non-videos) Arcade & Street Locations

Ten of 28 novelties (36%) with a response rate of over ten percent have above average performances.

	Rating		
	Aug. 1	July 15	July 1
1. Chexx/ICE	100.0	95.3	96.0
★ 2. Mini-Skee Ball/Skee-Ball	94.9	—	97.9
★ 3. Fax/Exidy	73.6	—	—
★ 4. Whac-A-Mole/Bob's Space Racers	72.2	—	100.0
5. Skee-Ball/Skee-Ball	71.4	100.0	99.9
★ 6. Boom Ball/Meltec	67.8	—	112.9
★ 7. Bully Buster/Bob's Space Racers	67.8	—	—
★ 8. Hot Spot/Bob's Space Racers	67.8	—	—
★ 9. Mr. Muscle/Zamperla	67.8	—	—
★ 10. Super Shifter/Bob's Space Racers	67.8	149.2	—

★ Conditionally Rated—Weekly average based on less than 50% response rate.

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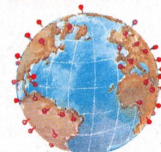
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NEWS

were issued by Superior Courts in West Hartford and New Britain.

Both Yaffa and Sanzo appeared in the respective Superior Courts on May 31 and pled not guilty to the charges. Pretrial hearings were scheduled for Yaffa on July 12 and for Sanzo on July 6. If found guilty, Yaffa could be sentenced to a maximum of two years and \$2,000 in fines; Sanzo could get four years and a \$4,000 fine.

The May 11 arrests followed a lengthy investigation, according to state police. Police had confiscated games from the Game-A-Tron facility in New Britain as early as May 18, 1982, and at Status Game in West Hartford on June 23, 1982.

In all, the investigation netted 36 allegedly illegal games. Most were taken from private clubs and fraternal organizations. "There were one or two instances in which illegal games have been confiscated in public cafes," state policeman Adam Berluti told *Play Meter*, "but they have been isolated and rare."

Status Game's machines seized as illegal were *Hi-Lo*, *Roulette*, and *Bust My Balloons*. Game-A-Tron pieces nabbed were *Black Jack*, *Draw Poker*, and *Roman Tallies*.

Berluti said the games are illegal because they are "capable of accruing credits redeemable in cash to the players."

But Status attorney Richard Robinson countered that Connecticut statutes delineating gambling from non-gambling machines are vague and, hence, unconstitutional. "It is difficult to determine the difference between lawful and unlawful conduct under our laws," he commented.

Robinson added that the applicable Connecticut statutes do not consider how the manufacturer builds the games to be used. Because of the lack of an "intent requirement," he insisted, "enforcement is arbitrary, capricious, and denies due process."

"The games are not gambling devices when they leave the Status Game facility," Robinson affirmed.

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LOCATION COST	\$	134 32
ADMIN COST	\$	23 01
NET PROFIT	\$	42 47
BOOK-VALUE	\$	2200 00
ANNUAL ROI		100 66x
ENTER (1=TOTALS ONLY)?		

OPERATOR'S INVESTMENT ANALYSIS (MONTH= 5 DAYS= 7)		
MACHINE NAME	PAC-MAN	
LOCATION	PR	
MACHINE #/TYPE	# 901 /VID	
GROSS REVENUE	\$	200 00
LOCATION COST	\$	165 58
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NET PROFIT	\$	11 40
BOOK-VALUE	\$	2200 00
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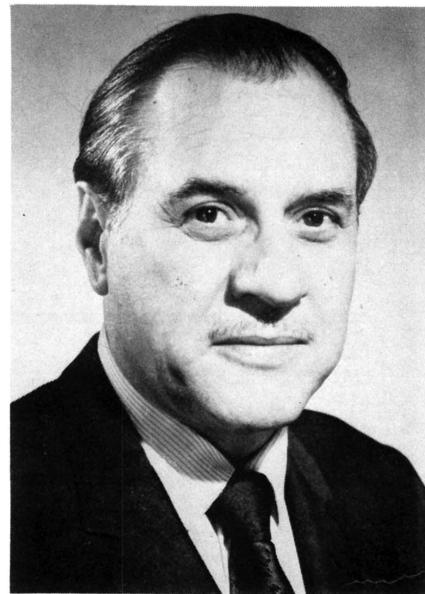
NEWS

Though Status Game's officials would not comment on whether they will continue to produce the allegedly illegal games in their West Hartford, Connecticut, plant, Yaffa told *Play Meter* his company is switching its production emphasis to pure amusement card games.

Gray area games sales are declining, he said, because of legal hassles in states like Ohio and Pennsylvania.

Shortly after that interview—on June 2—Yaffa and International Game Technology issued a news release indicating IGT would distribute Status Game's new *Fun Casino*, a pure amusement, player's choice, convertible card video.

DORIS STEPS DOWN



Ed Doris, the first director of the Amusement and Vending Machine Distributors Association, will resign and retire from the industry.

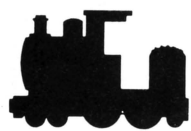
Doris will remain with the association through November 30 "to see us through the AMOA Show and our annual membership meeting," he noted.

After 25 years in the amusement and vending industry, Doris is resigning to care for his wife of 42 years who has waged a long battle against the side

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effects of radiation treatment for cancer.

"I love what I'm doing," Doris said speaking of his association with the two-year-old distributors' organization. "But my first priority is my wife."

Doris was selected to carve the association's course shortly after it was founded in May 1981. Prior to that, he had been with Rock-Ola Corporation for 23 years.

No successor to Doris was named, but the board of directors appointed an "executive search committee" composed of Norman Goldstein of Monroe Distributing, Al Kress of Coin Machine Distributing, and Jerry Gordon of Rowe.

CALIFORNIA TAX AMENDED

California operators were successful in getting a proposed 6 percent gross



receipts tax amended, despite a frantic search by the state's congressional bodies for revenue to close a \$466 million gap between the proposed budget and projected revenues for the coming fiscal year.

Responding favorably to industry lobbyists, the state amended the coin-op amusement device section of its so-called "loop-hole tax plan" to require

a \$100 per year payment on each game.

The industry is not unequivocally satisfied with that amendment. The measure would return one-third of the per machine collections only to cities which opt not to impose their own taxes on coin-op machines. Industry leaders would rather have the measure worded to pre-empt localities from being able to add any tax burdens on operators.

"How anxious do you think a city collecting \$300 per game is going to be to accept \$33 per game from the state?" Ira Bettelman of C.A. Robinson asked.

The gross receipts measure had been passed by the California Assembly and was to be voted on by the Senate when Senator Daniel Boatwright was able to effect the amendment. From there the amended measure was turned over to a subcommittee for further consideration. Industry sources predict the bill, which calls for revenues from a wide variety

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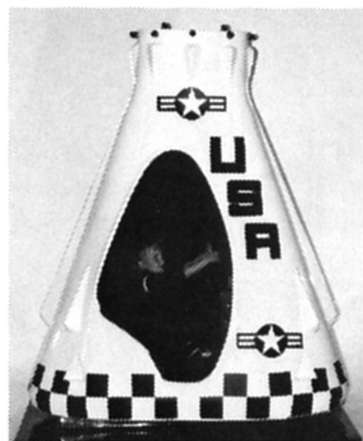


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of sources, will be delayed in the Assembly while congressional bodies hassle over inclusions and exclusions in the annual state budget.

"We have been able to show state officials there was no auditable way to enforce this tax on the industry," said Dennis Loper, lobbyist and now director of the California Coin Machine Association. "We were also able to demonstrate that a gross receipts tax cannot be passed onto the coin-op consumer as is the intention of such taxes. And we were able to present figures indicating operator collections are down about 40 percent throughout the state."

FLORIDA OPS UNSCATHED

A 5 percent gross receipts tax that passed the Florida House by more than a two to one margin died in the

Senate as the state's extended 1983 legislation session ended.

Florida is still looking for \$40 million for its budget. But it is unlikely a special session called to attack that problem will revive the coin-op gross receipts tax, for it would net the state less than \$3 million.

"We were not too concerned when the measure was passed by the House, because we were concentrating our efforts on the Senate side," commented Manley Lawson, chairman of the Florida Amusement and Vending Association Legislative Committee. "There are 120 representatives, but only 40 senators."

Lawson said FAVA was joined by non-member operators in orchestrating an effective campaign to contact Senate members. The association also paid \$15,000 to hire a legislative lawyer who worked with FAVA lobbyists to educate Senate members on the coin-op industry's perception of the effects of the tax.

The death of the measure means

that, despite a state revenue shortfall, no new industry legislation came out of the Florida 1983 congressional session.

'CUTE-SEE' GETS SPLIT DECISION

The U.S. District Court in Chicago ruled Update Kits' *Cute-See* did, and then again did not, infringe Bally/Midway's copyrights relevant to *Pac-Man*. The decision said that *Cute-See* is an infringement of the *Pac-Man* computer program, but not of *Pac-Man* as an audiovisual work.

The split decision means *Cute-See* was not found to be close enough in its characterizations or in its play to be considered an infringement of Midway's game. But the computer program for the game—printed out and laid side by side with the *Pac-Man*



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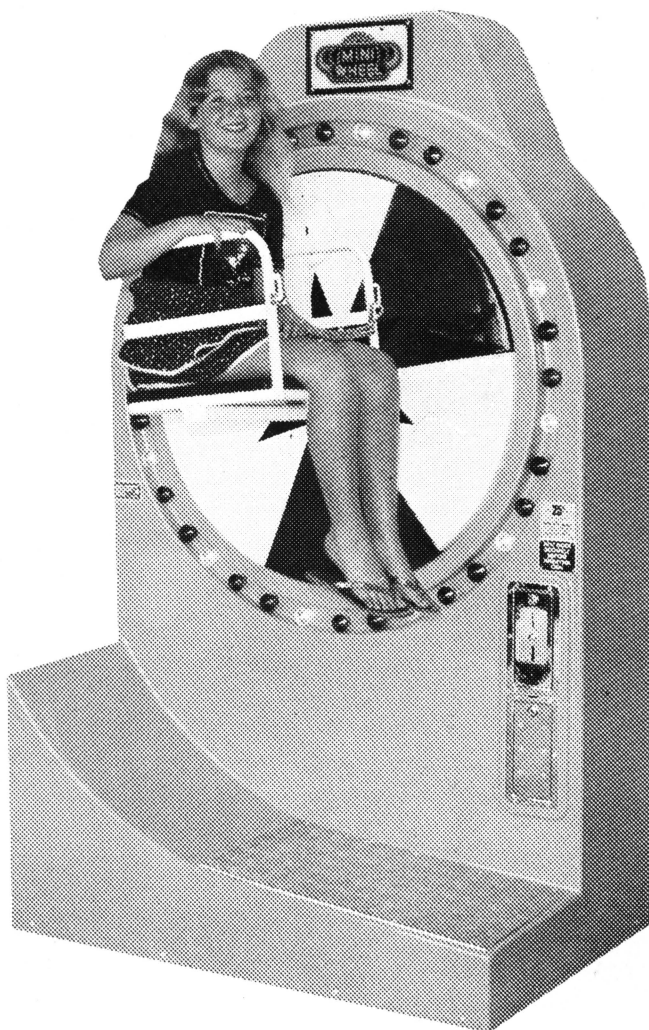
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program—is substantially similar.

Update Kits' Fred Slayton said his technicians are now reworking the

computer program of Cute-See to make it legally marketable. The company, now known as Midwest Update

Company, will add other refinements to the kit to make it marketable, he said.

Originally promising a decision by early January, Judge Hubert Will delayed issuing his ruling until June 1. But Slayton sold the kits while the parties awaited the court's decision. Slayton said he will offer replacement kits for the 50 original Cute-See kits he sold, and he will use guidelines set by Judge Will's ruling to produce update kits for several other games.

Will also addressed an *amicus curiae* (friend of the court) brief filed in the case by Shield, a defense fund organization which supports under-financed firms facing copyright litigation against large manufacturers.

Will said Shield's contention that operators have a right to use speed-up kits on video games they have bought and own was effectively defeated by a recent 7th U.S. Circuit Court of Appeals ruling against an Artic International speed-up kit for Midway's *Galaxian*.

In that ruling, the 7th Circuit upheld the right of a game manufacturer to maintain control over speed-up kits as derivative works of his original products. Shield has appealed that decision to the U.S. Supreme Court on behalf of Artic.

NEXT THREAT: LOTTERY VIDEOS

Operators with bar locations trying to keep illegal gambling devices from absorbing quarters meant for pure amusement games have a new concern: legal gambling devices.

Some states want to locate video game lottery machines in bars to draw the interest of adults who regularly play coin-operated video games.

Lottery officials and researchers believe the video lottery game will improve each state's lottery gross take. Some have indicated the game will be the next major lottery product, doubling and perhaps tripling revenues.

Video game lottery machines have already been considered and dismissed in New Jersey, but some lottery experts believe the games will ulti-

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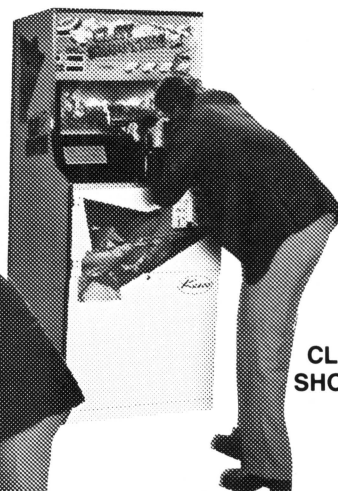
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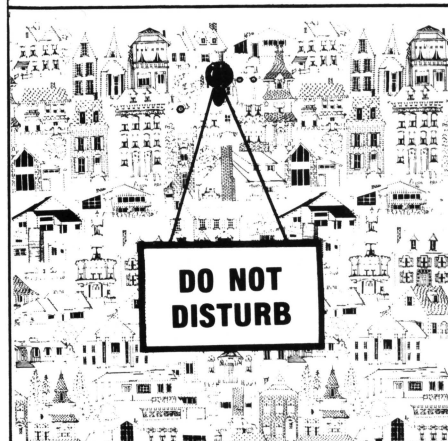
NEWS

mately take over in lottery states. To date, 17 states and the District of Columbia operate lotteries.

Leading the effort to convince lottery states to use videos is Scientific Games Inc., a Bally Manufacturing subsidiary which has developed a series of video lottery games to attract players. The games are based on current video themes. Players wander through mazes and blast alien spaceships with hopes of winning money.

Recent SGI research indicates most arcade game players don't currently participate in state lotteries. Of adults who regularly play video games in lottery states, 63 percent never bought an instant ticket and 91 percent never played the legal numbers. •

ARCADES MUST DEAL WITH COMPLAINTS



Can arcade operators be held responsible for controlling noise and disturbances that occur off their premises? Yes, theoretically and in practice.

In Kenosha, Wisconsin, city attorney James Conway advised the City Council to formulate an ordinance that requires an arcade owner to "protect the integrity of the neighborhood."

The authority to revoke permits of owners who don't keep their patrons from creating nuisances on and off their premises comes from the legislation devised to regulate taverns, Conway pointed out. But any

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- Enlarge the possible ways of doing business. For example, by keeping the cash and mailing a check, you have additional short-term capital for 2-3 weeks; or, by giving the keys to trusted locations, your collector can interrogate the machine and have the location give him a check on the spot.
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places of amusement where crowds gather and disperse can be required to employ whatever means necessary to see their patrons remain orderly, even after they have left the amusement sites.

Not only do residential neighbors have the right to protection from ram-bunctious players, merchants too can call for action if youngsters disturb their clientele.

The Baltimore City Council is considering a bill that will require arcades to get a special permit to operate because of the fear of "driving other merchants out," a Baltimore area planning committee member told the council. "It prevents other services from being available in the community."

In Santa Rosa, California, a proposed shopping center arcade was derailed by the City Council because other business owners speculated the noise and loitering might disrupt their enterprises.

National Coin Machine Institute

legal counsel Herbert Beitel said such council actions are within the law. Restricting arcade sites because of neighborhood disturbances is accomplished under the cloak of exercising "police powers," Beitel pointed out. "There is a broad latitude there. Police powers can get pretty arbitrary," he said.

Beitel suggested an operator who faces such a roadblock should check his community for other businesses that face similar crowd problems. By adopting successful measures of dealing with large numbers of patrons or by pointing out that other kinds of businesses face the same difficulties, an operator can often break down the public perception that the games cause problems.

An operator should also emphasize that patrolling neighborhoods is police duty, Beitel added and, most importantly, he should maintain a strict behavioral code for his establishment.

"Anybody who wants to, can keep

nuisances from happening," Kenosha attorney Conway summarized. •

MISSISSIPPI OPERATORS ORGANIZE

Sixty operators emerged from several days of meetings in Jackson in late March to announce the formation of the Mississippi Coin Operators Association. The organization is the first of its kind in the state.

John Bell of Vicksburg, the association's first president, said operators organized in the face of the threat of anti-industry legislation.

"We were just able to defeat a 5 percent tax issue this year," Bell said. "We hear, however, that next year they're really going to be coming after us."

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THE CALENDAR

July 15—17

Montana Coin Machine Operators Association, Bozeman

July 25—29

Tenth Annual Conference on Computer Graphics and Interactive Techniques, Conference Office: 111 East Wacker Dr., Chicago, IL. Sponsored by the Association for Computing Machinery's Special Interest Group on Computer Graphics, Engineering Society of Detroit, IEEE Technical Committee on Computer Graphics, and Eurographics. Detroit, MI

August 27-28

Music and Vending Association of South Dakota, Holiday Inn, Spearfish

September 8—11

North Carolina Coin Operators Association (NCCOA) Convention and Trade Show, Hyatt House & Convention Center, Winston-Salem, NC

September 22—25

West Virginia Music and Vending Association, Ramada Inn, South Charleston, WV

September 23—25

The New York State Coin Machine Association (NYSCMA) Annual Membership Meeting, Holiday Inn, Lake Placid, NY

October 7—8

Amusement and Music Operators of Virginia "Silver Jubilee" Trade Show, John Marshall Hotel, Richmond

October 13—16

12th ENADA (National Exhibition of Automatic Amusement Machines) Congress Building, EUR, Rome

October 13—16

National Convention-Exhibit of Vending and Foodservice Management, McCormick Place, Chicago

October 20-22

Spanish Amusement Trade Exhibition, Congress and Exhibition Palace, Sun Coast (Torremolinas, Malaga-Espana). Sponsored by the Spanish Association of Manufacturers and Marketing of Amusement and Gambling Machines.

October 27—30

AMOA Exposition 1983, The Rivergate, New Orleans, LA, Hilton Hotel, headquarters

November 16—20

1983 IAAPA Trade Show, The Rivergate, New Orleans, LA

NEWS

imposing restrictive legislation on coin operators, Bell noted, was to get Mississippi operators to pay the state license fee of \$30 per game. He indicated that would be an initial effort of the association.

Bell said he expected association membership rolls to grow due to the more than 450 amusement firms in Mississippi.

"Due to the phenomenal increase in the number of people who enjoy themselves playing the amusement machines and electronics games, amusement company owners throughout the state felt the need to become organized at the state level. This enables them, throughout the year, to maintain consistent policies of operating, in keeping with sound business practices," he added.

DEVASTATING TOWN FEES

Operators in small towns can be required to pay excessive video game licensing fees to pay salaries of police and inspection personnel, according to a decision of a New Jersey Superior Court.

"There are no volume discounts here," New Providence, New Jersey, City Attorney Edwin Dotten said. A provision of a 1966 New Providence coin-operated devices ordinance that required a licensing fee of \$250 per game was held as "reasonable in relationship to the costs of administering the licensing program," according to Judge Milton Feller. The judge also did not object to a \$50 increase in the fees, meaning the operators of the town's 15 games will pay \$300 each year to have each game licensed.

In small towns, those fees can be particularly devastating to operators who can be required to pay a part of a variety of agencies' activities and salaries with the revenues from a small number of games.

License fees differ from taxes in that fees can be charged only in amounts sufficient to pay for administering services required by the games.

Of the \$300 per game fee, \$35 is attributed to issuing the license, according to Dotten. The remaining money goes to pay salaries of police and construction inspection personnel.

"Nowadays, a construction inspector starts at a salary of about \$20,000," Dotten explained.



The Boulevard Club of Providence, Rhode Island, won the \$10,000 first prize at the Busch Pool League National team championships in St. Louis in June. Second place and \$5,000 were awarded to Parkway Tropics of Grand Rapids, Michigan. The 16-team tournament offered \$33,000 in cash and prizes and was co-sponsored by Dynamo Corporation and Anheuser-Busch Inc.

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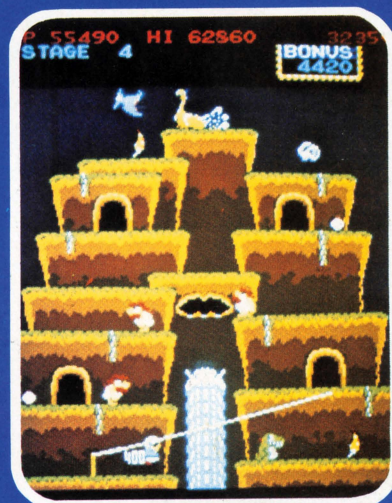
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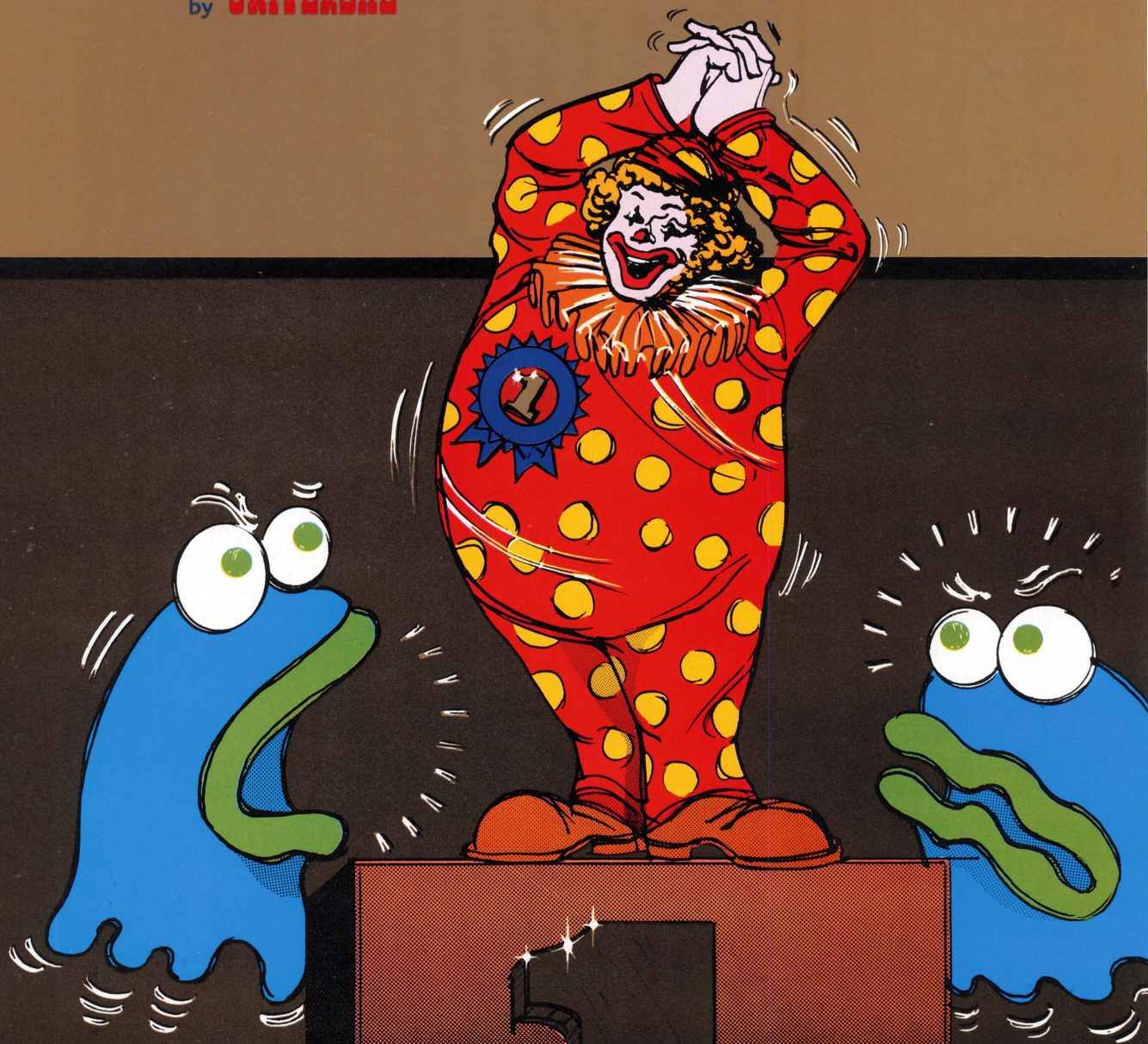


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Cleveland Coin,
Columbus, Ohio

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Computer software custom-made for music and games was exhibited by a company called The Option.



An ABC Coin-Sorting-Counting representative demonstrates its products.

Texas show:

TAXING FUN IS A SIN

By Valerie Cognevich

Texas faces critical legislation that some describe as the final shove to those on the verge of going out of business.

This crisis brought operators together at the Amusement and Music Operators of Texas state association meeting in Austin in early June to hear details of the proposed laws and to find a course of action.

Bob Hughs, AMOT's legal counsel and a former legislator, outlined the proposed tax. The governor wants to increase the decal tax and place a tax on gross receipts.

The state has referred to this tax as a "sin" tax making it easy to tax because no one supports sin. "What this tax

really is," Hughs said, "is a 'fun' tax since the legislature is out to tax fun."

Hughs compared this tax to problems facing anti-prohibitionists.

During Prohibition, Hughs was an anti-prohibitionist. In defending alcoholic beverages and cigarettes, Hughs noted that he was not very popular. When Prohibition ended, consuming alcoholic beverages was not very respectable. However, attitudes change. Amateur athletes are televised sipping a cold beer as a reward for a tough game, and businessmen relax with a refreshing drink after a hard day at the office.

Beer manufacturers spent millions

of dollars bringing respectability to beer, and today beer is a welcome addition to picnics and parties.

"We are facing a similar ordeal with video games," Hughs said. "Calling this a 'sin' tax is unfair because no one is for sin just like many were not for booze back in those days."

Hughs stressed that the industry has to protect what it has accomplished in showing the good side of this industry.

AMOT met with the governor with representatives of different groups of operators—those with under 25 games, more than a 100 games, and more than 200 games. Charles Ross, of Innovative Management Consultants,



Bob Hughs, legal counsel for AMOT, describes the tax proposals in Texas.



Stan Pearson (right) of A-1 Ashtray explains the benefits of his products.



Electro-Sport showed its racing game and countertop video games.



Dick Shannon of House of Cards talks with two operators as they try out Little Casino.



Pro-Tech Marketing showed the Heart Rate machine. Here representatives talk with an operator just out of the photo.

prepared a special presentation on finances.

The governor hopes to bring more than \$65 million in revenue to the state via the proposed taxes.

"All the taxes proposed will not bring in the money the governor thought it would," Hughes pointed out.

"Many operators just can't afford to pay the kind of taxes that have been proposed, and many would simply go out of business if the taxes are passed," he continued. "It just does not seem to be to anyone's advantage to tax a large group of small businessmen out of business.

"The danger we face now," Hughes said, "is that we just might fall into a governmental crack." In many states today, the government has no clear understanding of the economics of the industry.

Operators were encouraged to emphasize two important facts: economic truth and the harsh impact of even a small tax.

Ross told operators to give their financial statements to their representatives. "Don't lie," Ross said, "because we don't have to lie. Each operator's records will speak for themselves."

To help operators, the association has developed a package outlining the economic truth in the industry in very simple terms made especially for legislators who will not take the time to plow through mounds of paperwork to get at the facts.

Conversion seminar

Dave Goldner of Venture Line, Tom Struhs of Tago Electronics, and Byron Cook, a Texas operator, led a conversion seminar attended by about 60 operators.

Goldner pointed out that conversions have not had much distributor support making it necessary to sell directly to operators. This has, in turn, been a complaint from distributors.

Struhs agreed about lack of distributor support in certain areas, but Tago, until now, has only been selling to distributors. Tago is opening a distributorship to serve north central Texas called Tago-Texas distributing.

"Our purpose in opening this distributorship is to develop the conversion market," Struhs said. "As soon as the market is strong, we will willingly back out of the distributing end and sell only to distributors."

Strong support

Don McCullough, executive direc-

tor of AMOT, gave the association members a hearty pat on the back for their support. AMOT membership has increased 61 percent over the last year. The association has formed a hospital plan for members and organized 19 committees designed to work for the association.

"Communication is vital to this industry," McCullough stated. "The association is sending out a newsletter, *Route Reporter*, to strengthen the communication among operators."

"If we provide the services you need," McCullough added, "you will stay loyal to the association. And we need these loyal members to join hands to fight the legislative battles we are facing."

Exhibits

This was the first year the AMOT had exhibitors at the show, and there was a good turnout.

Nomac Ltd. displayed its *Century Darts* game which had been under an injunction until May 1.

"This was a very good show for the first time. I was very impressed. The people who were there wanted to talk to you," said Mike Gannon of Nomac.

Dick Shannon, representing House of Cards, said, "I felt like the operators were very leary about buying. The drastic changes the industry is going through have frightened many operators."

Mark McCleskey of Data East said, "This is one of the best state shows I have been to. The large operators were here, attended the seminars, and were more serious."

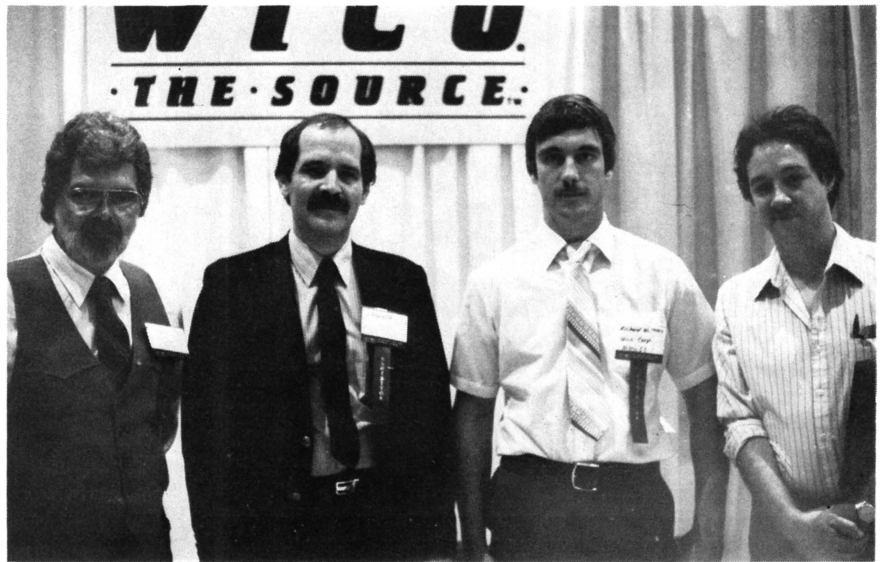
And as the coin-op industry has become more computer oriented along with the rest of the country, two companies exhibited computer equipment.

O'Connor Distributing has available to operators a computer service to shorten service problems. The mechanicals from games are programmed into the computer enabling an operator literally to repair a game from the computer's instructions. (See *Play Meter*, January 15, p. 111.)

Also a company called The Option displayed its software specially designed for music and games.

New officers

New officers for the coming year are: Jerry Kaler, president; Byrror Cook, vice president; Ronnie Daniel, secretary; Raymond Fickey, treasurer; and Vancie Todaro, elected executive director. ●



Here is a serious group of Wico representatives.



Dave (right) and Mort (center) of Merit Industries are in a serious discussion.



Clare Turlink of Universal (right) chats with Alan Rhodes of Tago and Leo Droste.

First aid for Williams-system video games

(What to do before you call Williams Service Department)

By James T. Hawes
Williams Technical Editor

Note: This article is indexed by subject. You can use the bullet (•) subheads to lead you to a topic of interest.

The Williams video system has been in the field since the launch of *Defender* about three years ago. While various refinements have been made, most of the circuitry in new Williams' games bears at least a family resemblance to circuitry in other system games. For the service technician, this means troubleshooting procedures that apply to one Williams game can be used on another.

In fact, servicing is the subject of this article—servicing you can perform with just game manuals, a logic probe, and a DVM (your video first-aid kit)...in the first 10 minutes after you arrive at a location. This kind of first-aid servicing will usually isolate your machine's problem to one or a few circuits on a single circuit card. As you'll see, first-aid servicing is a process of *elimination* and *deduction*. Many times the only two tools you'll need are the exclusive Williams game diagnostics and your common sense.

Williams service lines are open daily from 8:30 a.m. to 5 p.m. Central Standard Time. But before you call, spend a few minutes at the game to ask—and answer—the following power-on questions...

I. DOES ANY PART OF THE GAME RUN?

If so, which part? The answer to this question may permit you to eliminate:

- A. **parts not under microprocessor control** such as the transformer panel, general illumination, power supply, and hood lamp; or
- B. **the peripheral devices** such as the loudspeaker, volume control, monitor, joystick, and switches; or
- C. **one or more circuit boards.**

Parts Not Under Microprocessor Control

• Transformer panel

Do you have power to the hood lamp and coin chute lamps? If not, use an ohmmeter to check the main 3ASB game fuse on the transformer panel. If you replace the fuse but the new one blows too, proceed with this power-panel examination: Unplug the game. Disconnect the 12-pin connector that hitches the power-transformer primaries to the line-filter output. Now insert a new fuse and plug in the power cord.

If the fuse still blows, you may have a shorted varistor on the input of the line filter. (This inexpensive part protects the whole game from power surges by shorting, thereby quickly blowing the main fuse.)

If the fuse holds, the problem may not be on the transformer panel. But the transformer, monitor, or hood lamp might be shorted. Unplug the game. Disconnect the hood lamp and monitor power connectors. If the fuse remains intact when you power-up, your power transformer's probably OK. Now individually plug in the monitor and hood lamp. If one or the other blows the main game fuse, you've found the bad circuit.

If the fuse holds but nothing comes on, check your line filter for an open and scrutinize power transformer output voltages.

• Power supply

If all is OK at the transformer board, how about the power supply? Are the three LEDs lit? If not, inspect the circuit corresponding to the extinguished LED. Fuses intact? Electrolytics shorted or open? Check at the bridge for ripple of over 0.75V with your DVM set to AC.

Proper voltages should appear at the series-pass transistor leads. (These transistors are the two mounted on the heat sink.) If these voltages are improper, the 723 shunt regulator chip or associated biasing resistors may be bad.

The LED for any regulated supply will also fail to light and fuses should blow if the crowbar SCR has fired. *Never* replace input fuses with jumper wires, or you'll have to invite your fellow techs to a barbecue at the SCR's heat sink.

Try this instead: Disconnect the power-supply output connector with the game off and then re-fuse. Game-up and see if the fuse blows again. If not, the "power supply problem" has just moved to another board (or cable).

Look at your power wiring diagram to find out where the power from that particular supply runs. Disconnect each one of those places in turn until you stop blowing fuses. The first disconnected cable that permits the supply to run is the cable to the bad circuit board.

Peripherals

• Monitor

Is the screen dim—or black? There's a big difference. To help you decide, slowly turn up the monitor's brightness pot (located on or near the flyback transformer). Do

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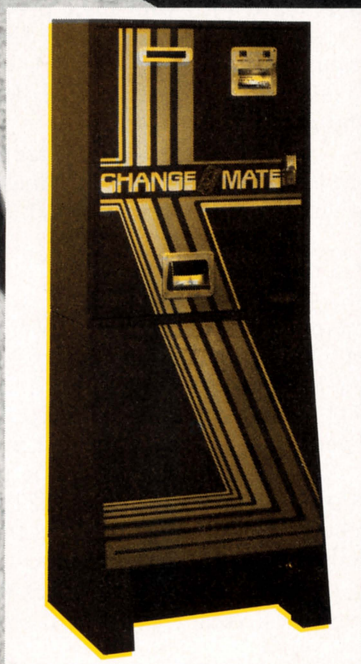
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you see a *raster* (illuminated screen)? If so, the monitor's probably OK. If not, check the monitor's in-line power fuse. Of course, if your problem is merely a dead monitor, you'll be able to hear sound effects when you initiate a game.

• Sound board

Run the sound diagnostics. These are explained in your manual. Does the game produce the appropriate sounds and speech (assuming you have a game with a speech module)? If so, the volume control, speaker, and sound board check OK. If not, test sound-board fuses, sound-board power-supply voltages (Low voltages or ripple may mean bad electrolytics again.), and sound-board crystal activity. (Check that with your logic probe.) For further board checks, refer to the circuit-board troubleshooting procedures below.

• Joystick

There are two types of joysticks. *Defender*, *Stargate*, *Robotron*, and *Joust* videos use *leafswitch* joysticks. These you can check with an ohmmeter. The contacts should produce a circuit (low) when they make, and open that circuit as the stick is released. A second type of joystick employs *optocouplers*. You'll find these nifty gadgets in *Bubbles* and *Sinistar*.

Optojoysticks. Because *Sinistar* needed a higher-resolution joystick (covering both speed and direction) than *Bubbles* did, designers created two vastly-different optocoupling schemes. All this sounds very arcane, but don't let it throw you. While they don't have physical contacts, optojoysticks are *still* switches and can *still* be tested with a multimeter.

First, do you find your regulated 5 volts at the joystick board connector? If not, you may have a bad connector. Follow your schematic and check for positive 5 all the way back to the power supply. That way you'll know just where the failure occurred. Naturally you may be fortunate: you could discover an electrically-leaky capacitor across the 5-volt supply right on the joystick board!

• Interface board

Given a good positive 5 supply at the board, you may either proceed with opto-diagnostics as detailed in Williams' instruction manuals, or simply check the interface board with your logic probe.

On *Bubbles* you should have a *high* indication at all input pins when the joystick is in the neutral position. Whenever the joystick is deflected however, one input should be pulled *low*.

On *Sinistar* you should see a *low* at the input pins with the joystick at rest. This becomes a *high* at one or more pins when the joystick is deflected.

• Coin-door switches

Coin-door switches are easily checked with an ohmmeter. Turn the game off. Now look for make-break action at the switch. You should also check the cabling back to the ROM board. Now game-up and use the logic probe: your ROM board inputs should receive a *high* indication for all open coin-door switches and a *low* for closed switches.

This pulse should also be present at the input to the ROM board PIA chip (a 6821 IC with 40 pins). Coin-mechanism switch pulses pass through inverters, so expect pulses from these switches to be upside down. If any of these pulses are missing, check the appropriate inverter as shown on your ROM-board schematic.

Circuit Boards

• Game diagnostics

How to separate good boards from bad. This is a two-step process. Ideally you'll be able to check your results. But that's getting ahead of the story. Here's how we do it at HQ: try to put the sick machine into its *Diagnostic Mode*.

If it behaves and compliments you with the detailed RAM-ROM-CMOS routine, you'll learn a lot about the status of your machine. Your CRT may say you have a "RAM error" and give you the number of the RAM. Then all you need to do is turn off the game and replace the bad chip. If, on the other hand, it sticks with the beginning rug pattern (or worse: a black or spuriously-patterned screen), don't lose hope.

Open the back of the machine, press the CPU board reset switch, and watch the seven-segment LED display on the ROM board. The display can tell you a lot about your game even if so much video RAM is dead that no CRT display is possible. (*Defender* video substitutes a display composed of four discrete LEDs. The following discussion refers to the newer display used on subsequent games.)

The seven-segment display will show a sequence of three numbers. The first number in the sequence usually refers you to video RAM (1) or game ROM (2) failures. The second and third numbers delineate which device is suspected. For example, the indication 1-3-1 corresponds

to a bad video RAM 31 (row 3, number 1).

Color RAMS on the CPU board aren't tested as part of this procedure. But static RAMS 41 and 42 on the *Sinistar* ROM board are checked here. Table 1 details the tests for various memory chips.

• Swapping boards

I've said that locating the bad board is a two-step process. But now let's suppose you've read the ROM board seven-segment display and discovered a RAM failure 31. What do you need a second step for? The failure is obviously on the CPU board. No, it's not. Not necessarily.

A bad board is only bad when it fails in a good game. If you suspect bad video RAMs, swap the CPU board into a working game. This double check is important because an LED-display RAM error message indicates that more than one RAM is bad.

Multiple RAM failures can be mimicked by a host of other problems:

1. ripple, low voltage, or over-voltage shutoff at a power supply regulated output;
2. a faulty video-RAM multiplexer chip;
3. a bad data latch;
4. control signals (E, Q, WE-not, RAS-not, or CAS) that fail to pulse;
5. a flaky RAM multiplexer or shift register.

Still you don't have to check all these possibilities

Table 1. Memory-Chip Tests

CHIP	LOCATION (BOARD)	QUANTITY	WHERE TESTED?	ERROR SHOWN ON ROM-BOARD LED DISPLAY?
(1) video RAM	CPU	24	RAM-ROM (rug-pattern) tests at power-up and in Diagnostic Mode	yes: "1" followed by two numbers indicates bad video RAM
(2) game ROM	ROM	11-12	RAM-ROM (rug-pattern) tests at power-up and in Diagnostic Mode	yes: "2" followed by two numbers indicates bad game ROM
(3) CMOS RAM	CPU	1-2	Diagnostic Mode	yes: "3" indicates bad CMOS RAM chip (or chips in <i>Bubbles</i>)
(4) static RAM	<i>Sinistar</i> ROM	2	RAM-ROM (rug-pattern) tests at power-up and in Diagnostic Mode	yes: "1" followed by "41" or "42" indicates bad static RAM
(5) decoder ROM	CPU	1-2	not tested	no
(6) color RAM	CPU	2	purity-screen and color-bar tests in Diagnostic Mode	no
(7) sound ROM	sound	1	Diagnostic-Mode sound test	no
(8) sound RAM	sound	1	Diagnostic-Mode sound test	no
(9) speech ROM	<i>Sinistar</i> speech	4	Diagnostic-Mode sound test	no

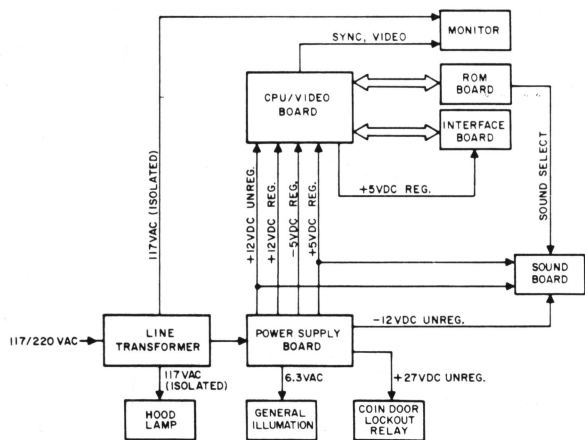


**Figure 1. Simplified Block Diagram
The Williams Video System**

right away. Having swapped the suspected CPU board into a good compatible machine, you'll find that either the suspected board works or it doesn't. If it does work, then you *must* check the power supply in the bad game.

• Power supply—or video RAMs?

What if you don't have another game? Of course, then you can't make the swap-test. But you can allay your very proper suspicions about the power supply. Check the regulated outputs for correct DC voltages. Are they within about two-tenths of a volt of their specified outputs? How much ripple (read that "AC" on your meter) is present: there should be *no measurable ripple*...unless your meter can see five to 10 millivolts!

Now take that meter to the CPU board. Just because you have your three regulated voltages doesn't mean that you have them at the video RAM banks. If a spike-suppression capacitor shunts to ground, it can pull down the five-volt supply to one or more RAMs. There's one of these capacitors protecting each RAM (and each chip) on the CPU board! Assuming that the three voltages are good at the RAM in question, from here on we troubleshoot the RAM circuitry.

Swapping RAMs is probably the fastest way to spot the naughty ones. Borrow a good set of 4116s from a

working game and put them in the ailing game. Power-up. Now watch the screen and ROM-board display.

If you still get a RAM-error message, since the RAMs are good you must have a problem in the associated circuitry:

1. the 74153 address multiplexers, or
2. the 74LS373 or 374 data latches, or
3. the 74LS257 RAM multiplexer.

These are good places to start checking address, data, and control lines for activity with your handy-dandy logic probe.

If you get the all-clear signal from the MPU and the game enters Game-Over Mode, you're almost home for dinner! Now all you need to do is power-down and replace the fresh RAMs with the old ones. Do this one at a time, then power-up, and test again. Whenever you receive a "RAM ERROR" message on the screen, you've located a dead RAM. Discard it and continue testing until you've checked all 24 of the original RAM set. That way you'll discard as few as possible, saving the boss money!

II. IS THE PROBLEM ANALOG OR DIGITAL?

This question will help you with the sound board. It also works wonders when you're trying to isolate a sync or color problem to the monitor or to the CPU board. Since peripherals like the monitor and the power amplifier portion of the sound board are analog, the import of this question is again to rule out certain parts of the system. This makes your troubleshooting job easier because you'll have fewer components to check, and more accurate because you'll be able to concentrate your efforts where they'll do the most good.

• Sound board again

D-vs.-A on the sound board. Sound board analog and digital circuits operate on different supply voltages. This helps isolate one set of problems from the other. However, the positive 12-volt unregulated supply to the power amplifier (*analog*) chip drives the positive five-volt regulator for the logic (*digital*) circuitry. This means that if the regulated five fails, you'll have to check for the positive 12. Incidentally these supplies are right there on the sound board instead of where you'd expect them on the power supply board!

Then what would a digital sound problem look like? Table 2 shows three typical ones we hear every day at HQ:

Table 2. Digital Problems on the Sound Board

SYMPTOM	PROBLEM CAUSE
(1) missing sounds	sound-select inputs (see schematic) stuck high (open) or low (shorted)
(2) low hum from speaker, but no game sounds	bad crystal clock (could also be analog: regulator chip, filter capacitor)
(3) no sound (amplifier works)	bad PIA (6821 chip) on ROM board or sound board, bad cabling to sound board, bad multi-input NAND gate (4068 chip), or bad sound-select buffer (4050 chip)

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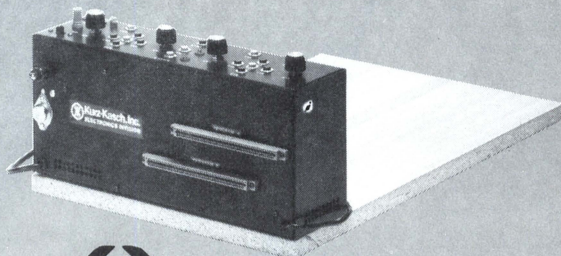
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All right, what would an analog sound problem look like? Since the power amplifier is the last chip in the sound board chain of circuitry, the most common analog problem is loss of all sound. Intermittent sound is also fairly common. Both ailments are usually caused by leaky filter capacitors in the sound-board power supply. Check the largest cap first. Does it read only a few ohms? Replace it. Now try a voltage test with the power on. You should be able to read your 12-volts unregulated across this large cap. Check for AC here too, of course. If you have more than about three-quarters of a volt of AC, replace the capacitor. You've probably been wondering where that humming sound was coming from!

All these sound-board problems are easy to locate with a logic probe, a multimeter, and your schematic set. More detailed troubleshooting information is provided in your game's instruction manual.

• Monitor: another view

D-vs.-A at the monitor. If you have a video or sync problem in your game, you'll want to determine whether it originates at the monitor (analog problem) or at the CPU board (digital problem). The easy way to find out is to swap the CPU board into a working game and see if it produces the same problem with a good monitor. If you don't have another Williams video game, break out your DVM or scope...

Check for activity at the monitor inputs. The CPU board is supposed to feed your monitor positive vertical and horizontal sync pulses...plus red, green, and blue video signals. Allow time for CRT warmup and then look for these signals. Don't worry about level for now. Just see if they're present. If not, you can suspect the cable or CPU-board circuitry. If they're there as big as life, your monitor's kaputt.

Here are a few monitor-troubleshooting pointers. First, after you decide you have a monitor problem, determine whether it's a raster (screen-illumination) or video (picture) problem. This technique neatly halves the number of circuits you may have to check. Also remember that output or power devices generally fail more often than small-signal devices. Of all the output devices in a monitor, the horizontal output transistor (mounted on the right-hand side of the chassis) fails most frequently. Numerous monitor problems are illustrated and categorized by circuit in Williams literature.

III. BOARD PROBLEMS FROM THE NEXT GALAXY—DO YOU HAVE 'EM?

Although Williams games are manufactured here on earth, we occasionally receive service calls that seem to originate on the Dog Star. These are the type of problems that can make an experienced technician cringe and run for the antacid drawer. I'll venture three here, since that's about how many my stomach can stand...

• Power supply (reprise)

Your friend the capacitor. Power-electrolytic filter caps do have a tendency to fail after a time. Sometimes they open up and dump ripple onto your logic voltages. Sometimes they short and, if you're lucky, only blow a fuse. But consider the fortunate technician who has an intermittent logic supply by virtue of a malingering capacitor: usually the game works. Then right in the middle of a game—Snap! The game resets, tests its RAM and ROM

YOU CAN BANK ON

BAGMAN

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THE GAME:

The player maneuvers Bagman through various mine shafts picking up money bags and placing them in the wheelbarrow at the surface of the mine.

A time controlled bonus is awarded upon placing the money bag in the wheelbarrow.

While climbing through the mine shafts, Bagman must avoid pursuing guards, the moving ore carts and the moving elevator.

Bagman can temporarily defend himself by using a pickax or dropping a money bag on the pursuing guards.

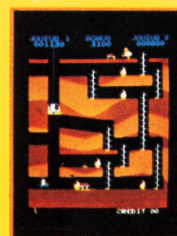
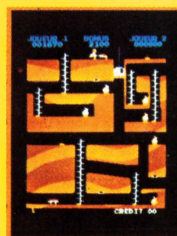
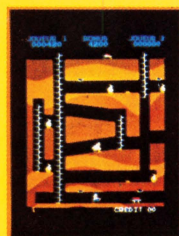
Bagman is moved horizontally and vertically by 4-way joystick.

The action button is used to make the Bagman perform the other tasks:

- Pick-up and drop the money bag
- Pick-up and drop the pickax
- Grab and release the ceiling beam to avoid the ore carts
- Placing a money bag in wheelbarrow
- Pick-up and drop the wheelbarrow



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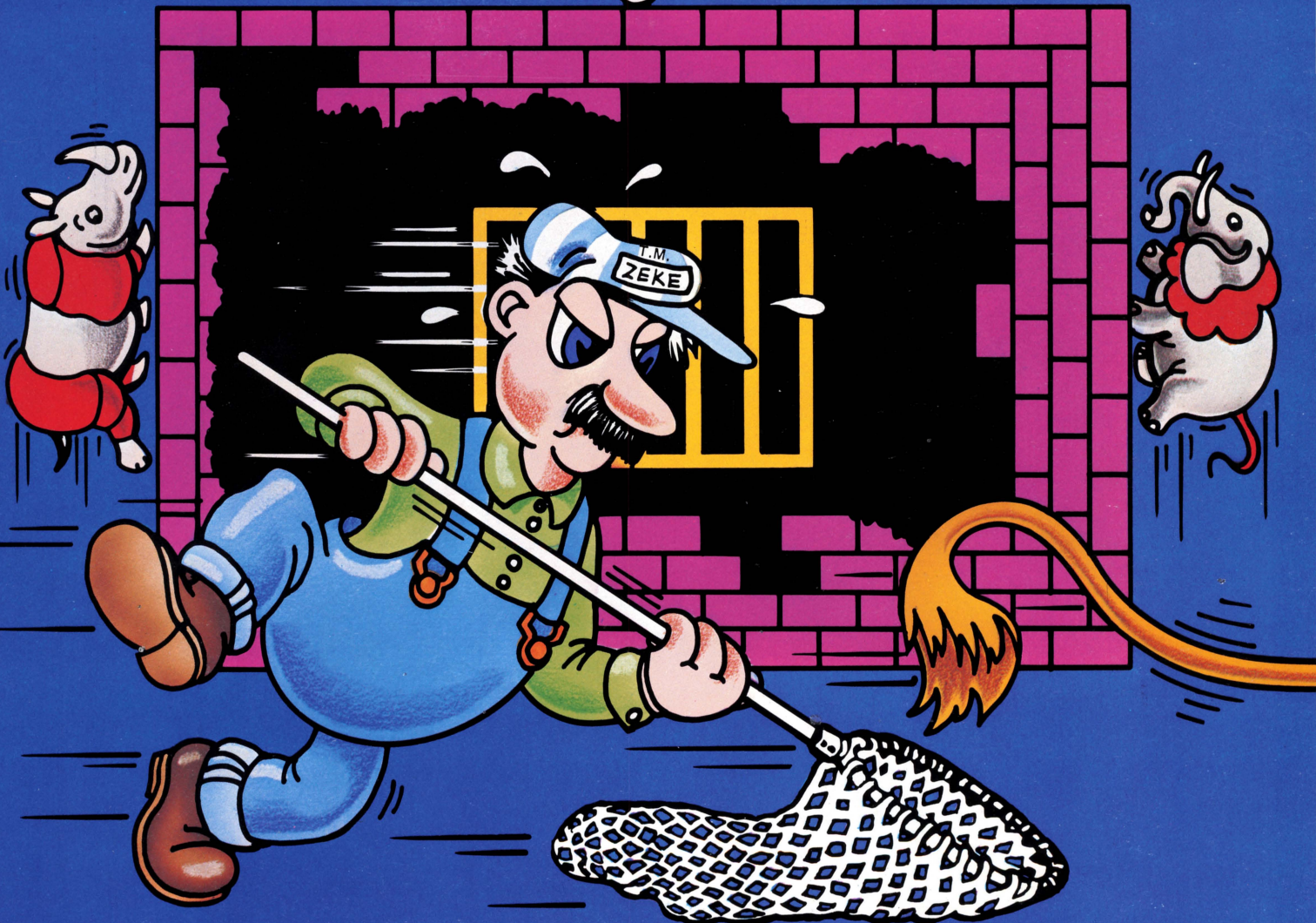


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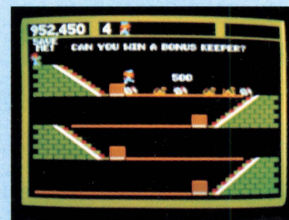
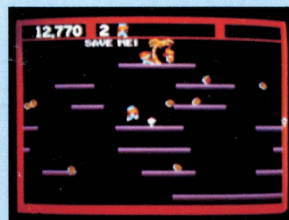
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Next Zeke must leap from ledge to ledge to reach his girlfriend, Zelda, held hostage by a monkey who's throwing coconuts. The ledges move in opposite directions, and if Zeke falls, it's all over. If he can swing it at this stage, Zeke can make points here, too, by collecting bonus objects as he goes. The struggle seems all worthwhile when Zelda is rescued.

But Zeke still has to face two more brick zoos teeming with the meanest animals ever. Luckily, a net can be used to catch the escaped animals and return them to their cages—if Zeke can reach it!

As the adventures alternate, survival becomes more difficult. In each of the "brick" screens, a more challenging animal with a higher point value is introduced. And in each succeeding "ledge" screen the ledges move faster, until they finally become invisible. With only his memory of past ledge patterns in relation to the still-visible bonus objects and coconuts, Zeke must jump from one invisible ledge to another to save Zelda!

"Escalator" screens, in which bonus zoo keepers can be won to help Zeke out, are interspersed between the other screens. Here Zeke must jump over hordes of animals—plus an electrical cage—in order to jump onto each escalator, till he can rescue Zelda up above. The higher he gets, the quicker the animals become. But victory is sweet when Zeke saves Zelda at last!

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*The more you eliminate, the closer you'll be to the problem
that ran the machine down in the beginning
(and the less you'll have to fix)!*

chips, and comes up innocently in Game-Over Mode. You're out a quarter, which is no big deal. But when will it happen again? Swap the power supply board into a known good game. If the problem moves with the board, check for AC ripple at the regulated outputs of your power supply. Mr. Power Cap has left his calling card.

- **CMOS**

Ninety-nine ships for a quarter. Do you think you could make money on *Sinistar* with that setting? Since (1) game adjustments are stored in the CMOS RAM and since (2) the CMOS RAM can be persuaded into perpetrating some truly bizarre shenanigans, (3) you may find a game someday that thinks it should award 99 ships for a quarter. You might also find that it offers 41 games per credit. Or that as the second ship is destroyed, the game is abruptly over.

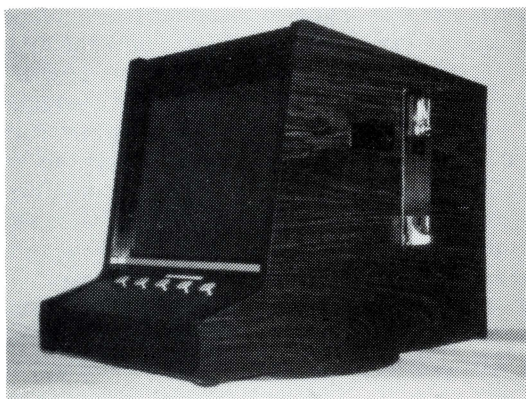
Your CMOS RAM has been "programmed" by static. One way to disillusion it of these spurious programs is to turn the game off and remove one of the batteries. Next wait a half-minute and return the battery to its holder. Now game-up and behold: all should be back to normal. (If

not, check CMOS power—3.5VDC minimum—both with the game off and with it on. Check the memory-protect line.)

- **Special chips**

Melty robots. If your robots leave nasty little colored trails all over the *Robotron* screen (or similar effects in subsequent games), you may think you're stuck in a technical time warp. Check the attract mode screens. What's missing? The game-status message (INITIAL CHECKS...etc.)? You may have a special chip that isn't very special anymore: find a game with a good set and swap the chips into your ROM board one at a time.

Article-over mode. This article described an easy type of first-aid servicing involving component-elimination and deductive reasoning. One idea behind first-aid servicing is this: the more you eliminate, the closer you'll be to the problem that ran the machine down in the beginning (and the less you'll have to fix)! Not "what doesn't work," but "*what does work!*" A second idea behind first-aid servicing is this: a symptom isn't necessarily the problem. You need to *analyze symptoms to decipher problems.* •



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Atari manufactures monitors for production games

By Randy Fromm

"What kind of a deal is that anyway?"

That's how most technicians react when they open the back of a *Quantum* video and get their first look at Atari's new color XY monitor.

The "Amplifone" monitor represents the company's first effort at manufacturing its own monitors for production games.

The most noticeable difference between the Amplifone and other monitors is that it is s-p-r-e-a-d-o-u-t! The picture tube is mounted independently at the front of the cabinet. The deflection printed circuit board slides into slots on the right side of the cabinet (just above the logic board), and the EHT (high voltage) unit is similarly mounted on the left.

Because the EHT unit is mounted quite some distance from the picture tube itself, the high voltage wire that connects the two is about 2 feet long and arcs across the inside of the cabinet. People are naturally paranoid when working around this wire as it has a potential of more than 20,000 volts! Be assured, however, that the wire is well insulated and presents absolutely no shock hazard.

Production changes

As with most new systems, there have been production changes in the Amplifone monitor. The modifications prevent premature failure of the EHT unit. Operators of *Quantum* should check the EHT unit, and perform the modification if it hasn't been done already.

Two diodes were added to the outputs of the two regulators (D5 & D6). These “clamping diodes” assure that the two voltage regulators come “on-line” simultaneously. Unmodified units have a nasty habit of blowing the

7924 (-24 volt) regulator.

The other modifications are: Replace R16 with a zener diode (6.2V), if removed, reinstall R18 (27 to 33K), and piggyback C-9 with a 1K, ¼ watt resistor.

Tuned circuit

Other than the changes listed, there is another point of interest regarding the EHT unit. The high voltage transformer in the unit functions as part of a “tuned” circuit. The resonant frequency of the circuit is determined by a capacitor (C8), a coil or “choke” (labeled MC1 on the schematic), and the primary coil of the transformer itself. In this case, the frequency of the tuned circuit is 20,000 cycles per second or 20 kilohertz.

In order to function properly, the circuit must be driven by a signal of the same frequency. This driving signal comes from the oscillator IC, a common type 555 timer. If the frequency of the oscillator is too low or too high, the circuit will draw excessive amounts of current and will probably damage the 7924 (-24 volt) regulator. (As you may have guessed, the 7924 is not too reliable. It's also not commonly used in games, so you might want to keep a few in stock.)

The frequency is adjusted with a small, screwdriver adjustable potentiometer (R7). Do not adjust this pot unless you have some way of determining the frequency of the oscillator, such as a frequency counter or an oscilloscope. Just a little twist can cause the oscillator to go way off frequency and blow the regulator. Generally speaking, there should be no reason to adjust this potentiometer.

Similarly, there should be little or no reason to change the setting of potentiometer R17. This pot sets the

threshold of the "EHT hold down" circuit. The hold down circuit is an X-ray protector circuit that detects an excessive high voltage condition and shuts down the oscillator circuit. Without the driving signal from the oscillator, the entire high voltage unit is shut down. The threshold adjustment is made at the factory and needs no further adjustment.

The rest of the monitor circuits are on the deflection board. It's a straightforward XY monitor from start to finish. Complementary pairs of transistors (one NPN and the other PNP) are used as outputs, driven by a split power supply (+/-30 volts) that is also located on the deflection board.

Time will tell how the monitor will fare under the rigors of daily (ab)use on the route. As an outspoken advocate of gearing up to perform all repairs in the field whenever possible, I like the layout of the monitor. Having separate boards that slide out affords instant access to all of the components for testing or replacement.

Those operators that subscribe to the “jerk the monitor out and bring it back to the shop” method may find this new monitor a bit disconcerting. Three units make up the monitor and, unless you have a game in the shop with a similar monitor, the deflection board, the EHT unit, and the CRT will all have to be pulled. This can be somewhat time consuming, not to mention that you will now transport a picture tube without the protection of a metal chassis surrounding it. (See related article this issue: “Replacing Picture Tubes.”)

Atari also plans to begin manufacture of raster scan monitors in the near future. There are 100 test monitors in *Millipedes* on location.●



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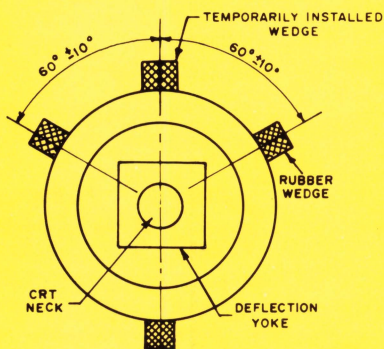
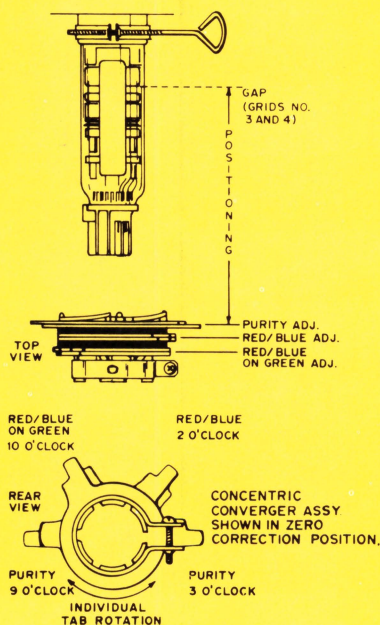
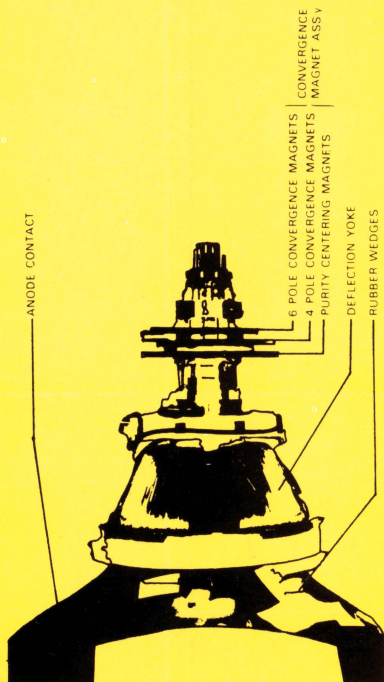
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REPLACING PICTURE TUBES

By Randy Fromm
and
Darrell Burton
(of Wells-Gardner Electronics Corporation)



The picture tube or CRT in a video game monitor might have to be replaced for a number of reasons. Careless handling can easily break the neck. The phosphor coating on the inside of the screen can become "burned in" with the image of the game, or the picture tube's electron gun assembly might fail.

Replacing a picture tube is a relatively simple task. With practice and just a little luck, CRT replacement can be performed quickly and easily.

Start by discharging the second anode. The second anode is the high voltage connection of the CRT and can be discharged by inserting a grounded screwdriver under the "suction cup" of the second anode connector. Remove the connector from the picture tube.

Unplug the yoke and degaussing coil connectors from the monitor printed circuit board, and remove the "neck board" from the end of the CRT. If you find a CRT ground wire connected to the neck board, disconnect it as well. The CRT ground is connected to a wire strap or spring that is stretched across the outside of the picture tube.

Unbolt and remove the CRT from the chassis. The yoke and degaussing coil will still be attached. Also mounted on the neck of the picture

tube is the purity and convergence ring assembly.

Loosen the clamps that secure the ring assembly and yoke to the neck of the CRT and slide them both off. Remove the rubber wedges that are glued to the CRT. You may also see some cardboard strips glued to the picture tube. Try to remove them without too much damage. You will use them later to help reconverge the monitor.

Remove the degaussing coil and transfer it to the new CRT. Some of the older monitors will also have a metal shield surrounding the picture tube, but today's picture tubes are internally shielded and do not require an external shield. Slide the yoke and ring assembly over the neck of the CRT, and rebolt the picture tube to the chassis of the monitor. Alternatively, the yoke and ring assembly can be removed before and replaced after the picture tube has been exchanged. Just put the whole thing back together the way you found it. Do not replace the rubber wedges or tighten the yoke or ring clamps at this time.

Reconnect the second anode, mount the neck board on the end of the CRT, and reconnect the CRT ground to the neck board. Reconnect the degaussing coil and yoke at this time as well. Finally, connect the 120 volt AC input.

The monitors in video games must be powered by an isolation trans-

former; they cannot be connected directly to the AC power. If the monitor is to be powered independently of the game (e.g., on a workbench), an isolation transformer must be used. An isolation transformer is a safety transformer that magnetically isolates the chassis of the monitor to prevent it from becoming connected to the "hot" side of the AC power line.

Purity

That's about it as far as the actual CRT replacement procedure is concerned. But the monitor isn't quite ready for action yet! For the picture tube to function properly, each of the three electron guns in the neck must be precisely aligned so that its electron beam strikes only one of the three colors of phosphor stripes that coat the inside of the screen: red, green, or blue. Red, green, and blue are the three primary colors of light.

Unfortunately, picture tubes cannot be manufactured with the precision that is necessary for such perfect alignment. This is where the ring assembly comes in. The movable rings are slightly magnetic and are used to correct the paths of the electron beams so that electrons from the "green gun" strike only the green colored phosphor, those from the "red gun" strike only the red, and so on. This is known as setting up the "purity" of the picture tube.

Degaussing

Degaussing is necessary to eliminate the effects of the earth's magnetic field on the CRT shadow mask, assembly, and the magnetic shield. The CRT should always be degaussed with a strong degaussing coil with the monitor turned off whenever it is moved from one location to another. Always degauss the CRT in the position it will be operated.

For example, the degaussing and purity setup may be done on a workbench and, then, when installed in a game, you find the purity is poor and degaussing will not correct the problem. The reason for this condition is that the CRT is at a 60 degree angle from the workbench position. At this angle, the magnetic fields are acting on the CRT components at different angles and strengths which change beam landing, purity, and convergence. When this condition exists, the purity rings must be readjusted.

Now we may also be faced with redoing the complete CRT setup including reconvergence. Poor degaussing can also adversely effect the ability to achieve proper convergence. When you must set up a CRT for purity and convergence, as in the case of a replacement, be sure you have a good strong degaussing coil, a signal generator with the cross-hatch/dot pattern, purity functions, and required video and sync polarities.

To set purity, first push the yoke loosely against the tube funnel and tighten the yoke clamp for a slight holding grip. Next, position the purity rings of the convergence/purity magnet assembly, over the G₃-G₄ gap of the CRT gun assembly as shown.

Next, adjust the purity and convergence rings to the positions as shown below when looking from the neck of the tube toward the yoke.

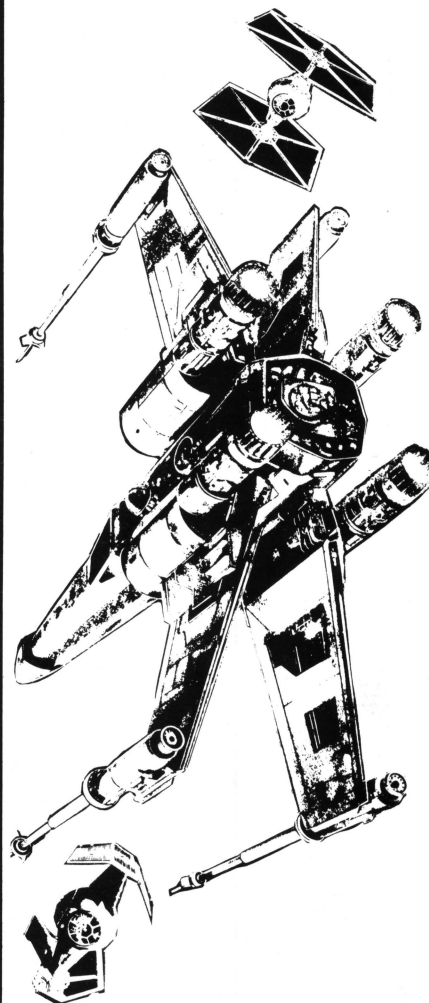
Small positioning errors of the purity magnets relative to the G₃-G₄ gap will not degrade or seriously affect the capability of these components to produce good purity. With all connections from CRT to monitor made, position the monitor in its final operating position. Degauss the CRT with the external degaussing coil.

Turn the monitor on and allow the CRT to warm up for at least 15 minutes. With the generator connected to the monitor, set purity function to green raster. Adjust the red and blue cut-off controls fully CCW, or to raster cut-off, and the green cut-off to a reasonably Lit CRT screen. Pull the yoke back toward the purity rings until the green belt has appeared.

Now, center the green belt horizontally as much as possible by separating and rotating the two purity ring magnets. Then push the yoke forward gradually until the raster is uniformly green. Then insert a wedge just far enough to hold the yoke in a centered position and tighten the yoke clamp. On a good CRT, the proper purity appearance should occur when the yoke has been moved away from the funnel a distance of approximately 1/8 inch minimum to 9/32 inch maximum.

Next, check the red and blue raster for color purity by adjusting the red or blue cut-off control for a reasonably Lit raster. Always turn the cut-off controls CCW, on off, for the unused screen colors to prevent color contamination. Positioning the yoke on the CRT neck for purity is known as

STAR WARS



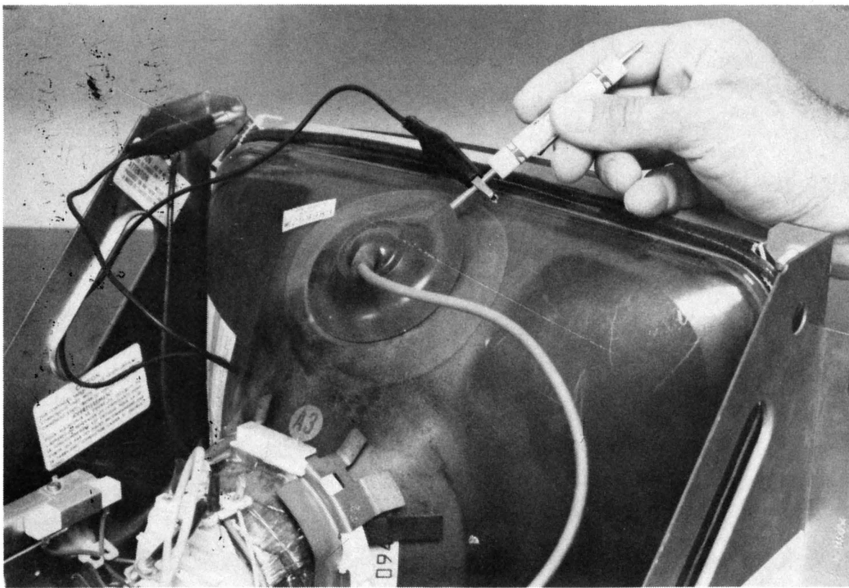
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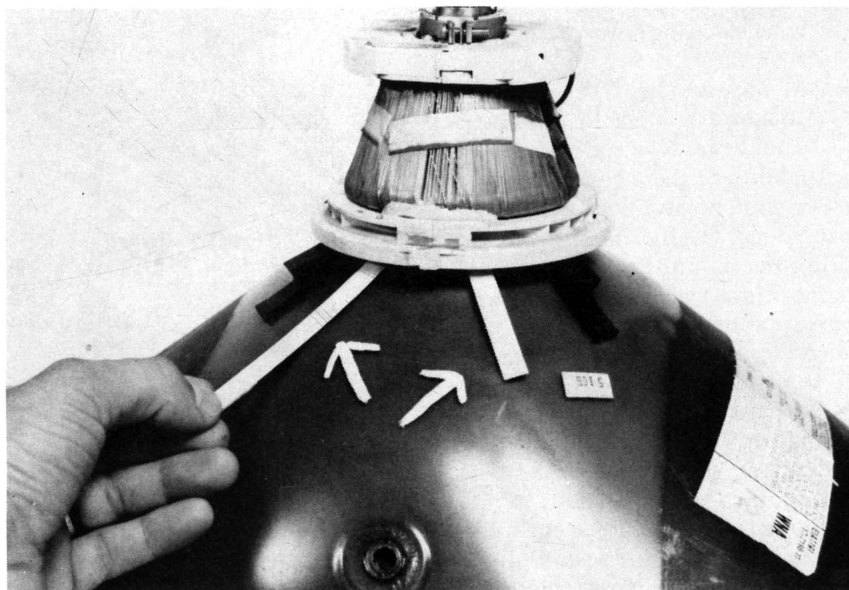
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Discharging CRT.



Inserting magnetic tabs for final convergence of edges.



Picture tube can be degaussed with a soldering gun. Turn the gun on and move it in circles around the front and sides of the CRT.

finding the color center of the tube. This is the point where the influence of the yoke's magnetic field on the electron beam is correct, allowing the beams from all three guns to speed through the slots in the shadow mask and strike only their own color phosphor in all areas of the CRT screen.

Due to production tolerances in these components, you may find a slight impurity in one or two fields after achieving purity in the green raster. If slight repositioning of the yoke, either forward or backward, does not achieve the desired purity in all three fields, then a slight readjustment of the purity rings should produce the desired results. The purity rings provide the additional magnetic field to cover the small deficiency in the CRT-yoke tolerances.

Now you can set up the CRT cathode to GRID #1 cut-off voltage, commonly called Black Level, G_2 or screen cut-off and tracking at the correct color temperature.

Then turn on the signal generator for the cross-hatch/dot pattern. Reduce the vertical size until the top and bottom of the pattern are just visible. Rotate the yoke until the pattern is straight horizontally and tighten the yoke clamp.

You are now ready to proceed with the convergence procedure.

Convergence

Now that all of the electron guns are hitting the right colors, you should be able to install the monitor in the game, right? Well, not quite! The multi-colored displays of a video game are created by various combinations of the primary colors. When the red and blue phosphors are illuminated side by side, we see the color magenta. Blue and green combine to produce a color known as cyan (a kind of a light, blue-green color), and a mixture of red and green is seen as yellow.

So to produce the yellow image of Pac-Man, for example, the CRT must display a red Pac-Man in exactly the same position as it displays a green image of Pac-Man. When the two are seen simultaneously, you perceive it as a single yellow image. The purity adjustment does not actually assure that the electron beam will hit the proper area of the screen, just the correct color. Final aiming of the electron guns is known as "convergence."

Your convergence efforts will be

directed into two areas defined as static, center area of CRT screen, and dynamic, which is all areas outside the center area to the edges and corners of the CRT screen.

A rule of thumb is the static convergence is achieved with the four and six pole magnet rings while the dynamic convergence is achieved by yoke adjustment and tabbing.

Always start with the static (center) convergence. The four-pole magnets control the horizontal and vertical red/blue lines. The six-pole magnets control the horizontal and vertical positioning of the red/blue lines relative to the green line.

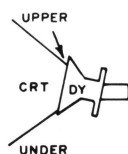
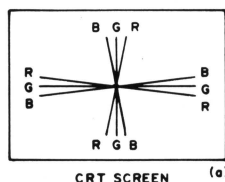
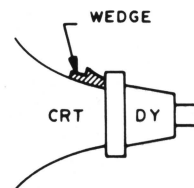
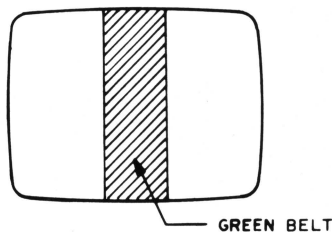
After achieving center convergence, look at the outer edges of the pattern and at all four corners to determine the major misconvergence areas. Observing the major misconvergence areas, move the yoke back and forth horizontally and then vertically. Note the correction possible and hold the yoke in the position for the best convergence compromise.

While holding the yoke in position, put the yoke wedges into position and tighten the yoke clamp tightly. This holds the yoke firmly in position and retains convergence.

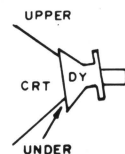
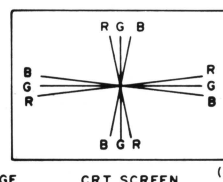
Remember the cardboard strips that were removed from the old picture tube? Well, now's the time to use them because after about 15 minutes to a half hour of rocking the yoke back and forth in every possible position, you will probably find that the edges of the screen are still out of convergence in some places. Taped to the end of each cardboard strip is a small piece of metal. The metal end of the strip can be inserted between the yoke and the picture tube to subtly alter the magnetic field of the yoke.

This allows you to converge a small area at the edge of the screen without affecting the convergence at other areas of the display. Just experiment with them until you get it right in all areas of the screen. These "magnetic shims" can really be a lifesaver! You can make your own if you need to. They're made from ordinary sheet metal. Any metal that is attractive to a magnet will work.

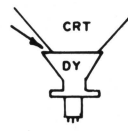
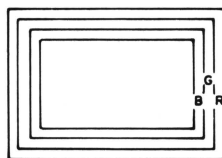
Following these procedures and with practice, achieving the best purity and convergence possible with the production components should be easier, and the results will meet the requirements of the product. •



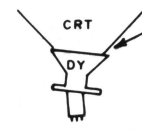
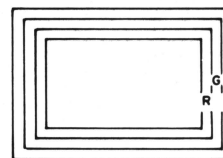
INSERT RUBBER WEDGE FROM UPPER SIDE



INSERT RUBBER WEDGE FROM LOWER SIDE



INSERT RUBBER WEDGE FROM LEFT SIDE



INSERT RUBBER WEDGE FROM LOWER SIDE

GREEN GUN IS THE CENTER GUN.
CONVERGE THE RED AND BLUE.
THEN CONVERGE RED AND BLUE ON GREEN.

VERTICAL CONVERGENCE BLUE & RED 3.2	4-POLE MAGNETS	
HORIZONTAL CONVERGENCE BLUE & RED 3.3	4-POLE MAGNETS	
VERTICAL CONVERGENCE BLUE & RED ON GREEN 3.4	6-POLE MAGNETS	
HORIZONTAL CONVERGENCE BLUE & RED ON GREEN 3.5	6-POLE MAGNETS	

REPEAT 3.2 & 3.3 IF ALL LINES ARE NOT CONVERGED AT CENTER

DON'T THROW AWAY THAT BURNED CONTROL PANEL

By Stan Pearson

Have you ever been on the route a week or two after you've put out a video game and found two ugly cigarette burns over Player 1 and Player 2 buttons?

You slap an ashtray on the game below the control panel, but this doesn't stop some good customers from placing their cigarettes back in the same grooves they already started. A few weeks later, the burns get darker and darker and bigger and bigger, and the heavy plastic begins to curl up from the heat. At this point you rationalize by saying, "I must have put the ashtray on too late. What the hell, let them burn it up. They're paying for it."

Your business is starting to drop off on the game so you decide to move it to a new location or sell it. But with burns like those, it will have to go to a second-rate location. The question is, how are you going to make this game look better? Here's where we put some technicians to work.

Have no fear, you don't have to buy another overlay or heavy plastic if it's a game built like *Donkey Kong*. You don't have to waste money buying a sheet of steel, like a piece of armor, to cover the disrespect shown your favorite game when it was new—the game you just had to have even if it meant putting a strain on your checking account. It can be repaired to look almost like new. Step by step, here's what to do:

Remove the whole control panel from the game. If you are a technician,

you know you're supposed to unplug the wires coming from the control panel. If you're not a technician, you can just jerk the wires apart as usual.

Next, unscrew the burned buttons from the control panel. Take a medium rough grinding wheel 1½" in diameter by ½" thick or larger. With your electric hand drill, grind off all cigarette burns from the plastic on the control panel, but do not grind all the way through the plastic. As you are doing this, move the grinder around so that your work looks as smooth as possible. Looks terrible at this point doesn't it? Grind the burned places off the buttons you removed. Do not try sanding deep burns with sand or emery paper as it takes too long.

Steel wool next

Next, take medium grade steel wool and smooth over the rough spots on which you were grinding. The steel wool should be worked up and back in the same direction as the scratches left by the grinding wheel. It still looks bad at this point, but don't give up hope.

Get two heavy spring clips with smooth lips like those sometimes used on car batteries and sold at auto supply stores. Place both clips about ⅛" over the edge of the plastic where it curled up from heat. The other lip of the clip is under the wood part of the panel so that the plastic is being forced back into place. Naturally, it won't go back on its own.

Get out that old fashioned soldering

iron you were thinking of throwing away, the one with the great big tip on it. The tip can be cleaned by filing or sanding if necessary. Do not let the soldering iron overheat, but while it is heating, move it back and forth directly on top of the curled area where the cigarettes once were. The plastic should curl back to its original position as when the game was new. Remove the spring clips and buff again lightly with steel wool.

Now, to remove the remaining little scratches left by your steel wool, spray the plastic with WD-40 oil. Wipe with a soft cloth. It looks almost new again, doesn't it?

After the push buttons have been sanded, spray them with a cheap can of quick drying spray paint of the buttons' original color. Reattach the buttons to the control panel.

If you cannot uncurl the plastic over the control panel completely after applying heat, get a couple of rivets or Phillips' pan head sheet metal screws, #6 x ¾". Drill ⅛" holes above each button, equidistant from the top to line up with others placed there by the factory. These screws or rivets should pull the plastic down to its original position.

Pride from work

Now, it looks good doesn't it? You saved yourself some money by not having to buy a new control panel, but best of all, you get a little pride out of your accomplishment. •

You don't have to buy a sheet of steel to cover the disrespect shown your favorite game. It can be repaired, step by step.



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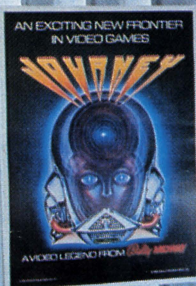
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FRANK'S CRANKS

By
Frank "The Crank"
Seninsky

Wico tour indicates pinball, pool table revival

Since this is the Service Issue, I thought I'd feature Wico Corporation, the leading manufacturer and supplier of coin-operated amusement and vending machine parts and accessories. Nearly 90 percent of today's games are equipped with Wico joysticks and other parts.

Let's look at its customer base: Atari uses its joysticks; Bally its buttons and switches; Williams uses both Wico joysticks and now its coin door on the *Joust* pin; Gottlieb uses its coin door and controls; Taito its joysticks, doors, and buttons; Stern and Sega use its joysticks; and Nintendo will probably switch to Wico in the near future. Have I missed anyone?

I recently visited the Wico plant in Niles, Illinois—here's my report. Wico's president, Max Wiczer, is one of six brothers (Jack, Harry, Milt, Walt, and Morris), all of whom have been involved in the company since its creation 43 years ago.

Max's coin-op career began in 1937 when he worked as a mechanic for the Monarch Coin Machine Company. At that time, there were a few thousand operators in the country, and it was nearly impossible to get parts, especially coils.

Max suggested that Monarch go into the parts business, but the management just laughed. So, with a \$40 loan, Max left Monarch in 1940 and in a basement formed a small company named Harry Marcus (for Harry Wiczer and his wife). Max believed then, as he does now, that the most important segment of the industry is the operator. He believes if you take care of the operator, the operator will

take care of you. (It's unfortunate that today many manufacturers and distributors have forgotten about the operator.)

Business began with the purchase of 5,000 rubber rings (five different sizes) which Max promptly sold in quantities of 200 at \$25 per set. His first customer was Liberman Sales in Minneapolis then owned by Bill Cohen and Bud Liberman.



In 1941 the boys changed the name to Wic Company or Wic Co., after brother Jack whose nickname was "Wick," and incorporated in 1942 as Wico Corporation.

In 1943, Wico started making coil parts with bobbins made of brass tubing and heavy-duty insulation paper. The coils were made on Satur-

day, and the rest of the week was spent selling the parts by driving to operators and sleeping in gas stations instead of hotels.

Max gives credit to a man named Harry Hendrickson from Minneapolis who showed him how to make quality parts. Max was a quick learner and was soon producing parts and time delays for government bombs. The company's philosophy was "make whatever isn't available."

Harry Williams

In 1943 Max met Harry Williams, who was then reconditioning and selling pinball games. Harry placed many orders for silver contact blades. Max next landed the Chicago Coin account and sold it screw machine parts.

Other new customers included Gottlieb, Keeney, Mapuf, Stoner, Exhibit Supply Co., Rock-Ola, Mills Novelty, Jenco, and Seeburg (absorbed by Chicago Coin, now Stern). Also at that time, Max notes with a grin, a salesman named Ray Malloney worked for Duval Manufacturing, a manufacturer of counter games. Duval then merged with Line Manufacturing that made Bally games...but that is another story.

When I asked Max about his competition in those early days, he jumped up and said "When you're old enough to breathe, you're old enough to fight. There's nothing for nothing, and we're still fighting."

The first Wico plant was located at 816 W. Erie Street in Chicago in a 5,000 square foot building which housed nine employees. Today Wico

has a 180,000 square foot facility and more than 600 employees.

The company is divided into three divisions: distribution (the largest, sells to 20,000 operators worldwide), OEM—Original Equipment Manufacturers, and the Consumer Division. About 30 percent of the 14,000 catalog items are actually manufactured in Niles.

According to Max, the game industry is going to be "better than ever." He feels, as I do, that pins are going to come back and Wico is tooling up to be ready. With an optimistic outlook for the future, Wico is investing in high efficiency rapid-producing parts machines.

I spoke with Jack Wiczer, the national sales manager. Jack stated that pool is also coming back strong. Wico sells a lot of pool cloth and carries Maley, Stevens, and House cloths. Jack feels that House cloth (made by Charles House Co.) is the longest lasting cloth and that operators still don't know much about the kind of cloth to use and usually don't make accurate purchasing decisions.

Operators should use cloth with a directional finish for two reasons: first, this kind of cloth stands up at least twice as long as non-directional cloth, and second, directional cloth makes for a faster, more professional game, which means more money for the operator. The cloth should be put on so that the cloth direction goes away from the break direction.

Another misconception is that rubber backed cloth is more durable. This is false! A slate table doesn't require backed cloth because felt adheres well to slate. Backed cloth was originally introduced so that the felt would stick to the wooden beds that were used on cheap pool tables and bumper pool tables. If you eliminate the cloth backing, you can purchase a thicker ounce cloth that will last longer for the same cost.

New products

Now here's a look at some new products. Wico is especially proud of its

new blade cutter machine which produces about 275 embossed blades each minute. The newly designed X-contact blades are much better than the cross-hair contact blades. The X-blades are beveled, and the line contacts rub over each other like an X. This avoids the sawing effect that occurs, for example, on the *Centipede* firing switch blade contacts, which after about a month, develop a notch from constant rubbing. The Wico X-blades will last much longer.

Wico has recently started making



JOYSTICK

completely assembled units, precision-molded and aligned. These units (a pop bumper assembly, for example) won't wear out like those that are slapped together and have too much play. If four components are each off 1/16", a unit could easily be off 1/4". A new button made entirely of two pieces of self lubricating plastic without a spring or an E-clip is being tested. At the time of this writing, more than 6,000,000 cycles of testing have been completed on the button which will be introduced in a few weeks.

Most of the plastic parts are made from lexan, ABS, or nylon resin, all with virgin plastic. Lexan has the best memory retention, but ABS is the

most durable. ABS is also called cyclocac and is made by Borg/Warner.

I was surprised to see that Wico also makes cue sticks, but I knew that it was the largest importer of cue sticks from the Orient. The handles are made of Brazilian hardwood, the shafts of maple. The two sections are mitered and reverse-mitered, pushed together, and glued. Then the wood goes through an automatic lathe, three sandings, a sealing, a buffing, laquering, another buffing, a weighing, stamping, and is finally balanced.

Vending repair operations are handled by Jim Warda. Here pumps, cold water ice makers, coin changers, counters, CO₂ regulators, and coin totalizers are repaired for operators. Wico offers long warranties on these repairs.

The stock area is divided into eight aisles. Each "picker" is responsible for the stocking of his aisle ensuring that inventory is on-hand. The whole stock area and order process is completely computerized. Customer Service processes about 600-700 orders daily, and Wico boasts of getting out more than 94 percent of the orders within 24 hours.

Joystick improvements

Wico is always improving its joysticks. It is currently working on an infinite-life optical encoded model and three directional joysticks. These will surely be used on future games. The Consumer Division can make up to 12,500 joysticks per day and these are selling like crazy.

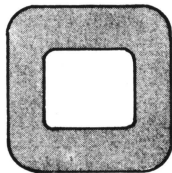
I want to personally thank Max, Jack, Gordan Goranson (president), Larry Kesselman (national OEM sales manager), Alan Walter, Phil Bernstein, Art Noparstak, and Linda Schooley for giving me the grand tour and so much of their time. Wico is a company that I believe will never desert the operator.

As always—"Keep Cranking!"

P.S. Why is it I've not received one service tip from you operators? Either you're too lazy or you just have no tips to offer!

*Max Wiczer believes that pins are going to come back,
and Wico is tooling up to be ready.*

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Tips for Troubleshooting Non-videos

By Mark (Bear) Attebery
Vending International Corp.
Technical Service Director

This article contains game modifications, that have been recommended by manufacturers, and some troubleshooting techniques mainly for non-video units.

First, let's look at Atari's *Dig Dug*.

One problem occurred that really had me lost until a store tech for a ShowBiz Pizza location in Minnesota

contacted me about the same problem.

To alert you to the problem, the noticeable symptoms will be a vertical bar with trash on both sides, and it will appear to be in the vertical sync circuitry of your monitor or the vertical deflection circuitry of your main logic board.

Troubleshooting the problem from

this point will take four to six hours if you find the problem at all! It's been found (so far, only in the *Dig Dug* units), that the filter capacitor (27,000 uf) in the power supply causes this problem when it becomes weak (starts leaking) and won't filter out the ripple.

There are three different colors of caps used at present: blue, silver, and green. The green caps seem to be causing most of the trouble. But the other colors are quite capable of going bad also! Larry Villella (the store tech) brought this to my attention and I thank him.

Next, let's move into what I enjoy most of all—non-video arcade units. Bob's Space Racers produces a popular arcade and carnival piece called *Whac-A-Mole*. The problem with the game is that fibers from the tickets used for redemption will build up on the photo-optic sensor and not let enough light through to actuate the count circuit.

When that happens, tickets will dump out continuously, and the game can spit out a thousand tickets before someone gets the keys and blows the lint or fiber off the photo-optic switch sensor.

Correct this problem by making the photo switch sensor more sensitive.

1. Remove Resistor R1 and replace with a jumper wire.

2. Remove Resistor R2 (330 Ω 1/4 watt) and replace with a 330 Ω 1/2 watt resistor.

3. Remove resistor R3 (87K 1/4 watt) and replace with a 6.8K 1/4 watt resistor.

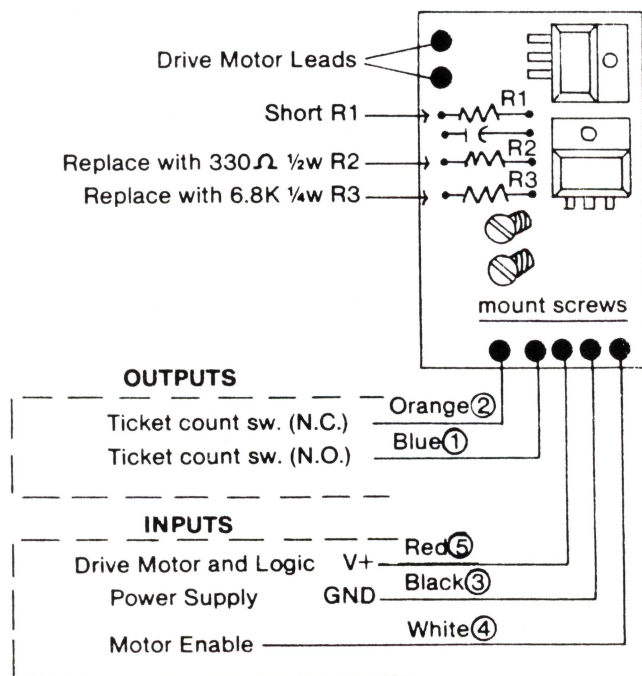


Figure 1

Bob's Space Racers "Whac-A-Mole" Ticket Motor Drive Board

Next step

The second step is to run a silicon tube from the output exhaust port of one of the character solenoids to the photo switch. This will cause a puff of air to be blown through the photo-optic switch's opening every time that character jumps up. The silicon tubing I used was remote control airplane fuel that I found at my local hobby shop. It will remain flexible but firm for years!

These modifications will reduce the amount of maintenance time spent on this unit each week, along with reducing the number of lost and unaccounted for tickets.

Do not use any form of liquid cleaner on these optic switches! Even the "safe for electrical components" cleaners may not be used. The reason isn't electrical; it's thermal. The use of an aerosol liquid on the light emitting section of some photo switches is like spraying a hot 100 watt light bulb with cool water—it often results in a small implosion. Use a fine brush or compressed air for cleaning these sensitive photo-optic switches.

• • • • •

Destron (the maker of *Astrograph*, *Bio-Rhythm*, the *Main Event*, and more) has some very good retrofit kits for the *Astrograph* and *Bio-Rhythm* units.

First let's look at *Bio-Rhythm*. Remember those beautiful capacitive switch plates for changing dates that made the cabinet look so ultra modern and are such a pain to work on? Well, Tom Taxon (in charge of technical services, design, etc. for Destron) sent me the following retrofit information to give to you.

New membrane switches eliminate the problems with the capacitive system. The *Bio-Rhythm* retro-fit display kit, part number 110350 for large cabinets, and 110351 for small cabinets, is designed to eliminate the problems with the older style capacitive switches.

The retro-fit kit consists of a new display board, a set of membrane switches, and all the hardware you need to install. Complete instructions are packaged with each kit.

Astrograph kit

On the *Astrograph*, direct sunlight or floodlights can be bright enough to cause sensor errors and mess up the unit significantly, so the retro-fit for this unit is called the "Astro Photo Sensor Conversion Kit."

This kit (part No. 130446) was designed to eliminate sensor errors caused by ambient light and sensor

variations. It consists of one "top of form" sensor board, one "line feed" sensor board, and one modified printer interface board with cables.

Installation consists of replacing the existing sensor units and the printer interface. Sensor position adjustments will work the same as before. However, *do not* use the modified interface board without the rest of the kit! *Sensor damage will result!*

The next retro comes from my home base. Vending International Corp. has been marketing a unit that has been very popular for one and a half years now. It is called *Frog Ball* and is a ticket dispensing unit.

The ticket dispenser circuit is a simple latch circuit and must have the switches adjusted periodically to work correctly. There is now a solid-state interface board that eliminates the need to adjust the switch and relay circuit because you remove the switch and relay circuit. It's very easy to install and requires only about three to five minutes to put on the unit.

• • • • •

Non-video troubleshooting

Whenever you have a problem in a non-video unit, you follow the same procedures for troubleshooting as you would a video up to a point. Let's look at them.

1. Is the A.C. getting from the wall to the power supply?
2. Is the power supply putting out a D.C. voltage that meets the operating requirements of the game?
3. Are all fuses/breakers set and operational?
4. Are all plugs/connections seated well?
5. Are all limit/trip switches operational? (Check for shorted or open switches by connecting your OHM meter at the plug that goes to the logic or interface board.)
6. Are all switches tripped that should be during the operation of a vend/game? (Remember that sequential logic must have a signal before it knows to go to the next step.)
7. Are your dip switches set correctly on your main logic board? (This is the most common error in all non-video units! Use the manual to set dip switches to manufacturers' suggested settings.)
8. Is your coin mech accepting your coins/tokens?
9. Check to make sure that no tilt or vandalism switches are tripped.
10. If all of the above checks out, you probably have a logic board or interface board problem. •



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Garland Garrett
Cape Fear Music Co. Inc.
Wilmington, North Carolina

I look for a good man who is knowledgeable and dedicated to his job and the company.

Fred Warner
Ace Automatic Music Co.
Saginaw, Michigan

FOR INFORMATION:

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BY DAWN ADORNO

I look for somebody with a brain and somebody who will do what you tell him. Sometimes after someone has been here three or four weeks, he thinks he knows more than you do. We need people who are willing to *listen*.

Also, I look for somebody who can lift his weight. We don't have a person do just one thing...he has to do everything and not complain that "Oh, I wasn't hired to do that!" My service personnel must be willing to do anything they're asked to do. I don't ask them to do anything that I can't do myself.

Tommy Greco
Greco Brothers Amusement Co. Inc.
Glasco, New York

The ability to produce and the ability to get the job done with no repeat calls are important. Honesty, neatness, the ability to work with people, and an interest in the company are also qualifications that I look for.

My employees must have an interest in electronics before going to electronics school. The first thing I ask them is what magazines they read. There's a difference in someone who reads *Popular Mechanics* and someone who reads *Playboy*.

For training, we have service videotapes and also send our personnel to the manufacturers' schools for short one-day courses. Other training comes on the job with our other personnel.

Al Eggermont Jr.
Music Service and
Vending Machines Inc.
Marshall, Minnesota



What we need is somebody with an electronics background who is service oriented and can handle people. We start our service technicians on a part-time basis, and that's how they get their training.

Anthony Storino
S & S Amusement Co. Inc.
Thoms River, New Jersey

Reliability, certainly, and the ability and desire to learn are what I look for. Honesty is also important because in our business, the technicians are involved in going out on location and making repairs.

Frank Cannon
Cannon Music & Amusement Co.
Cairo, Georgia

I want a person who is honest, Number One, and dependable. Also, the technician must have proper training for today's machines.

Gilbert Clevenger
C & C Music Co.
Richmond, Indiana

Dependability, the ability to get along with the public, and a neat appearance are qualities I look for. Electronics technicians also need to have basic background knowledge.

Lee Martin
Martin Amusement Co.
Macon, Georgia

DIAL DIRECT FOR SERVICE



Editor's Note: This listing is the technician's direct link to companies' service and parts departments. For quick reference, the companies are in alphabetical order. Note that some firms feature a toll-free number.

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Alter Enterprises
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Americade Amusement
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American Communications Laboratories
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American Shuffleboard Co., Inc.
201/865-6633

Amstar Electronics Corp.
602/997-5931

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Toll-free: 800/325-3353

Amusement Technology Inc.
201/774-3002

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815/962-3919
Toll-free: 800/435-8319

Atari Inc.
408/745-2900
Toll-free: 800/538-1611

ATW USA Inc.
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Auto Photo Co.
714/540-8082

B

Bally/Midway Mfg. Co.
312/451-9200
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800/323-7182 (out of state)

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Toll-free: 800/621-5139

Bob's Space Racers
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Brunswick Corp./Brunswick Div.
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Toll-free: 800/854-2666 (outside CA)

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D

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Dynamo Corporation
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E

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Electro-Sport Inc.
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Exidy
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J.F. Frantz Mfg. Co.
(Div. of Johnson Products Co.)
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800/447-6768 (outside IL)

G

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Game Plan Inc.
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Games of Nevada
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H

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I

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O

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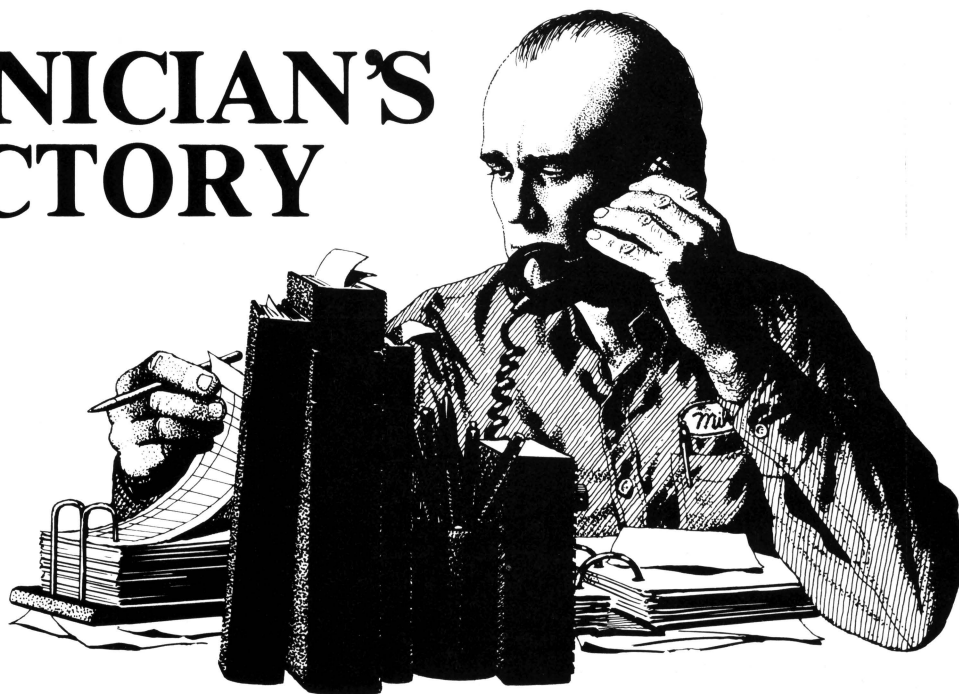
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Industry's healing process will be slow

By Roger C. Sharpe

With the AOE now history, its impact still lingers as the industry experiences an economic slump and future developmental patterns of equipment remain uncertain. The transition goes on. All are becoming more budget conscious in an attempt to wait out the storm without greatly disrupting day-to-day business.

Although there are some who are saddened that they can no longer take the money and run, the positive result has been a long overdue solidifying of the coin-op industry. For far too long,

everyone and his uncle looked to it as a way to instant wealth—and jumped in, head first, without ever really understanding what the game was all about. Slowly these fortune-seekers have faded out of the picture, leaving behind the professionals on which this whole coin-op phenomenon was built.

It was all inevitable, however, if one were to put any credence into the belief that history, indeed, repeats itself. After all, in 1932 when the industry experienced its first boom, the number of manufacturers and operators swelled to meet a then insatiable

public. Games, in fact, were produced by no less than three dozen companies—a far cry from the half dozen that started the ball rolling. The result then was an emerging emphasis on diversifying coin-op entertainment to include a variety of forms which expanded the scope of the business and helped carry it to the present.

Today we once again find ourselves in a highly competitive and glutted marketplace where production has outstripped demand to the point where a re-evaluation of the predicament has arisen in regard to parody products and a much more sophisticated audience than was the case only a couple of years ago. But just as the industry has done innumerable times in the past, it will once again rise and change to survive.

By the sheer longevity of its existence, coin-op equipment is destined to be with us always only because it is a business which has undeniably proven its worth as a money-making enterprise. Admittedly, the prognosis for, say, five years from now might well be something totally alien to what we are used to, but as long as people are willing to spend money on leisure time entertainment, coin-op machines will be a part of the picture—if not at the forefront.

So where does all this leave us? Interestingly, we are witnessing the end of an era and the gradual beginning of the next evolutionary phase in the growth and development of the industry. There is no doubt that substantial change is rapidly upon us. One need only look at Sega's *Astron Belt* and the more recent Cinematronics' *Dragon's Lair* to gain some insights into a potential direction game design will head in the coming months.



Promotional activities, such as Atari's Xevious commercials, will become more important in the next months.

AMOA prediction

But this isn't the elixir everyone is looking for to magically solve all the problems.

Lastly, has been the rather dramatic increase in borrowing the basics from older arcade staples and updating or modifying them for today's players who were never exposed to these art forms such as gun games (Stern's *Mazer Blazer*) or novelty attractions (like ICE'S *Chexx*). There are still more examples of this return to the past for design inspiration, but nowhere is it stronger than the current crop of pinball machines which have also staged a mini-comeback.

What all this means for the short run is that almost anything goes—or at least has a chance. Players have been fed a steady diet of the same type of entertainment for the past few years, and the time is right to test the waters. However, the biggest risk-takers will be the distributors and operators and whether they'll support anything else besides conventional video. Many are comfortable keeping with the same old thing and aren't willing to try something new, original, or even remotely different than what they've been handling.

But something will have to give before too long. Realistically, the summer should prove to be an accurate barometer as to whether the slump has bottomed out. Manufacturers are attempting to restructure production schedules so they are more in line with the market. The result is a much more cautious approach and attitude regarding profit projections and model runs, as well as striking an adequate balance between research and development for tomorrow's games and those being readied for release.

It won't be easy to turn things around. Instead, there will have to be a better understanding of the factors responsible. How can the current market accommodate any substantial volume of new products? Are there still more markets to tap, or have we reached a point of saturation in terms of where machines can be placed? How does the industry decide what to do with older equipment? Are there still resale possibilities to be explored? Will conversions serve to be only Band-Aids for a far greater dilemma? Will public tastes demand a wholesale change in philosophy and design direction?

The list of questions and issues is almost endless, but somehow each is intertwined with the next, so that



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movement to cure at least one ill will undoubtedly affect all the others to some degree. The available options are numerous and include a reappraisal by operators of token locations as to their pricing policy in order to remain competitive in a particular area.

Charge more per play

There is, after all, a point of excess and overkill, as well as diminishing returns regarding many game rooms. As a player, I love the bargains. But is there a situation we are nearing whereby the ability to charge more per play will be met with overwhelming resistance?

Promotional activities and other programs designed to raise the public's awareness of a game will become that much more important in the coming months, whether it's on the operator level or tied in through the manufacturer. Sega's *Zaxxon* commercials of last year must have had some impact on earnings, and Atari, for one, must have thought so since it began an advertising blitz heralding *Xevious*. This will be more prevalent if some games are to stand out and can especially be seen in the home video market.

Everyone is fighting for some advantage to combat the market's softness. Already a number of companies not able to compete have dropped out of the picture. And what we're seeing is a rash of tournaments and other promotional gimmicks geared to offer an incentive to the prospective buyer as well as to call attention to the product.

Think about how this industry's manufacturers take all the risks and have notoriously left a game to live or die on its own. The home cart makers then seize whatever success has resulted, promote the game, and reap substantial rewards from someone else's labor. It is, admittedly, a two-way street. Just being an arcade game doesn't insure success in the home, but it does help a loser look that much better.

Then there's the consideration, to modify a Peter, Paul, and Mary folk standard of the '60s, "Where do all the old games go, long time passing..." An equitable solution has yet to surface, outside of the gradual movement of conversions to be viewed as a cost-effective measure.

A home market for used equipment can be created just as it was less than a decade ago when pinball machines

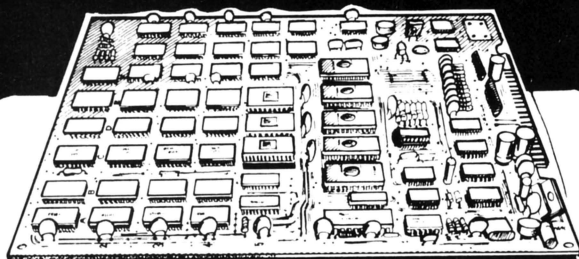
were viewed as rec room and den attractions. Why not video games? I have already seen a movement in this direction. It's become more frequent because when I visit a game room there's a sign proclaiming the availability of used equipment for the home.

Slow solution

The bottom line to all this is that the industry can't allow itself to run scared or resort to drastic measures in an attempt to stem the tide and turn fortunes around. The process will, by necessity, have to be slow and methodical if we are to see coin-op move ahead. The recognition, after all, must be that this is an inevitable phase. Quantum leaps ahead will always be on the horizon, but they are destined to level off or even decline before they can begin again.

This will be the case in terms of product development and any technological breakthroughs, as well as in gauging the ever shifting size of the target audience and potential levels of earnings. The hope is that those involved with the industry can learn from the experience and realize that the more things change, the more they stay the same. ●

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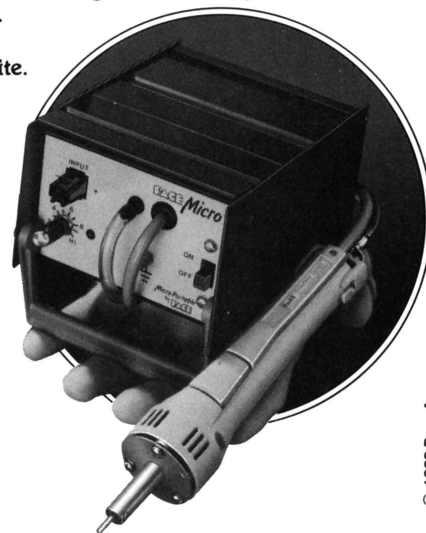
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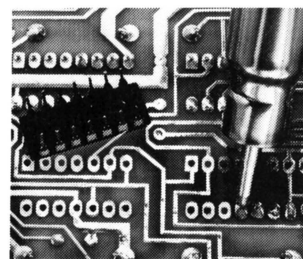
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Calling all kids

Kiddie Rides USA recently introduced several new rides at the Amusement Operators Expo in Chicago. The new *Police Bike* is a modified European police motorcycle, complete with windshield, headlights, and horn.

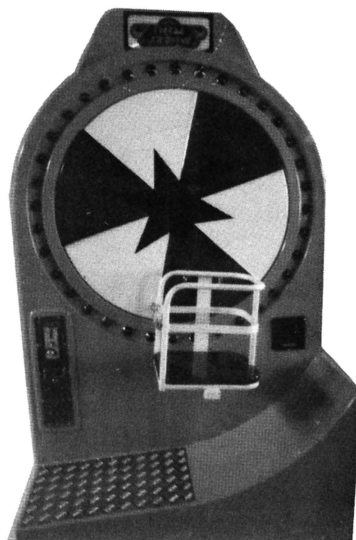
Also introduced is a new *Patrol Boat* that can be compared to a Coast Guard or harbor patrol boat. The ride has a spoked steering wheel and modified smoke stack. Once the coin is inserted, the engine roars to life imitating a chug boat. Two buttons beside the steering wheel allow the child to speed up the engine or sound an eerie fog horn.

Firebird is an addition to the hydraulic rides becoming more visible nationwide. The ride is hydraulically lifted and can rotate as well. It has flashing lights and space sound effects and is shaped like a futuristic starship.

The *Ralley Car*, a convertible, features dipping motion, chrome plating, and metallic fiberglass.

If a circus is your theme, Kiddie Rides USA now distributes a one-seat *Mini-Ferris Wheel*. For the smaller kids, the *Ferris Wheel* has a ring of flashing lights and plays calliope music.

If small is what you are looking for in coin-op kiddie rides, Kiddie Rides USA's new mini-tot rides are a solution. A *Mini-Police Car*, a *Mini-Fire Engine*, and a *Mini-Bunny* are built for the 4 and under crowd.

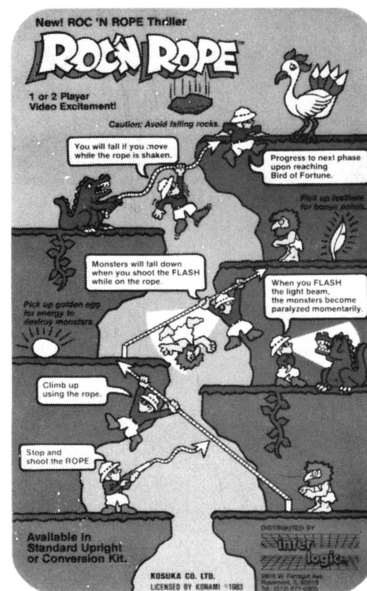


Four of a kind

The *Pit Boss* from Merit Industries Inc. is a countertop casino game that offers players a choice of four games: *Poker*, *Blackjack*, *Craps*, and *Acey Deucey*. Operators can set the amount of games per coin.

Peter Feuer, president of Merit Industries, says that "the entire machine has been designed to fit into an atmosphere where adults will enjoy it and play it. The fun and excitement of vivid colors, humorous callouts, and the chance to become listed as a top scorer all add to the machine's adult appeal. Even the solid wood cabinetry was chosen to get away from the toy-like image we feel that plastic projects."

Company officials say the *Pit Boss* is programmed for amusement only. It offers no replays, payouts, or awards of any value.



Cliff-hanger

Dangerous dragons, conniving cavemen, and monsters try to thwart the hero's attempt to score points while climbing a rope to the top of the canyon in *Roc 'N Rope*.

Roc 'N Rope, manufactured by Kozuka Co. Ltd., is being marketed by Interlogic Inc. of Rosemont, Illinois.

The player's goal is to catch the Roc—the bird of fortune—which is perched atop the canyon. While the player combats his enemies, he must avoid falling rocks from the sky that are aimed to end his safari.

The player is armed with a Rope gun that he fires from cliff to cliff to secure his climbing rope. After blasting away with his rope gun at the cliff above him, the player begins to climb his rope across the canyon as rocks crash down toward him.

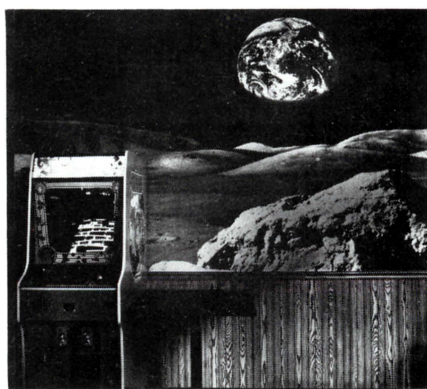
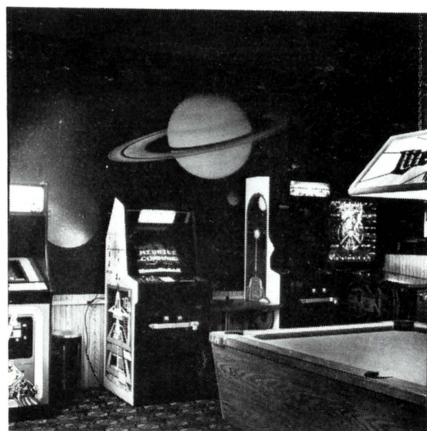
While attempting to rope his way to topside victory, the player can stop at a cliff to pick up golden eggs that give him renewed energy and accelerated speed to crash into his enemies and destroy them.

The player can also shine a magic light beam into his adversaries' eyes. One zap from his weapon and the demonic dragons become momentarily paralyzed. But, as he nears the top, the player will fall if a dragon shakes his rope.

Roc 'N Rope's four different obstacle courses become increasingly difficult as the player progresses. Bonus points are awarded for picking up scattered feathers fallen from the bird of fortune.

Aids to the Trade

Photo murals



Space murals from Oak Hill Graphics are a solution to bare walls, and space images are compatible with video game graphics.

"Saturn and Three Moons" and "Earthrise" are available in full color and come with hanging paste and complete instructions. "Moon and Stars" is a high-contrast black and white photographic collage. This mural can be hung two ways—with the moon at the ceiling or the moon at the floor. "Moon and Stars" is more than 20 feet in length (12 panels total). Cellulose paste, available at local paint

and wallpaper stores, must be provided for this mural which also comes with complete hanging instructions.

Some of the space murals feature pictures actually taken in space. Voyager I captured several images of the planet Saturn and its surrounding moons. The video images were reduced to three basic colors, transmitted separately to Earth by high-frequency radio waves, and recorded on magnetic tape. The recorded digital information was computer-enlarged and enlarged on color photographic paper utilizing a rotating drum optical recording device.

Environmental Graphics Inc. of Minnetonka, Minnesota, selected the four individual images and enlarged each 8" x 10" color print through a laser beam scanner, again converting the information to a digital format. Each image was further separated into four values and recorded on black and white photographic film to represent the four colors of the lithographic palette. A black and white star field was created for the background and composited with the planet and moon images to produce the full-color mural.

Panels can be pre-trimmed before hanging to fit smaller spaces. "Saturn and Three Moons" and "Earthrise" measure 8'8" x 13'8" each, while "Moon and Stars" measures 8'8" x 20'9".

A full-color brochure illustrating more than 20 Photo Mural designs is available by writing on your letterhead to Bart de Malignon, Oak Hill Graphics, 205 South Water St., Northfield, MN 55057. Telephone: 507/645-5585.

Club cards

Business Builders now offers plastic membership cards with rush one week production time on 100 minimum quantity orders. Lower priced printed

cards are also available with 1,000 minimum quantity and six to eight weeks lead time for production.

The membership cards are 2 1/8" by 3 3/8" 30 gauge plastic and are printed using a silk screen process. The cards can be printed in any standard color and can be embossed with consecutive numbers or individualized with a special prepaid embossing service. This service arranges for the factory to keep your cards on file. When you send in personalization information for new members, the factory will send the cards within one week.

Cards are printed with up to three lines of embossed copy. Once you pay for the cards, there are no additional charges. The factory also pays postage and handling.

Player Clubs are an effective way to build customer loyalty. Plastic cards are practical and efficient, and give arcade membership a higher perceived value, according to Carol Kantor of Business Builders.

The factory will make a sample card at no charge. To receive this sample card, send your logo and a rough sketch of what you want the card to look like to Business Builders, 10381 S. DeAnza Blvd., Suite 209, Cupertino, CA 95014. Telephone: 408/446-4400.



POWER SUPPLY DESIGN COURSE PSD-1

Lesson Ten: Zener Diode Regulators III

Editor's Note: The material below is a serialization of the Kurz Kasch correspondence course for electronics, designed specifically for the coin-operated amusement industry. This course is copyrighted and owned by Kurz Kasch of Dayton, Ohio, and its reprinting is being sponsored jointly by Kurz Kasch and Play Meter magazine. This material is authorized for publication exclusively in Play Meter magazine.

Lesson Ten – Zener Diode Regulators III: In this lesson the student will be taught to implement the zener diode into circuits having both a varying source and load. Again the principles of Lesson Eight will be called upon.

DESIGN CONSIDERATIONS FOR SOURCE AND LOAD VARIATIONS:

When considering a zener diode in a circuit in which both the source voltage and load current are variable, the primary concern is selecting the operating point. Referring to the diagram in fig. 10-1, notice that the selected operating point has moved towards the upper operating limit. By doing so, the highest possible value of ΔI can be attained and, therefore,

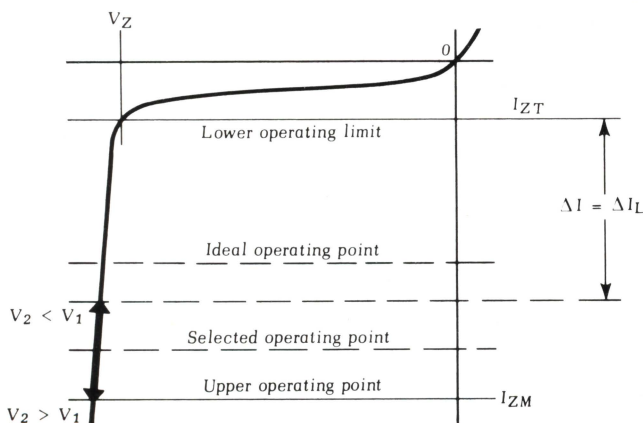


Fig. 10-1: A graphical presentation of a properly biased zener diode in a circuit having a varying source and load condition. By biasing the zener as close as possible to the upper operating limit, a greater range in possible load variation is attained.

maximum zener efficiency. Efficiency is attained, of course, not without its price. The price is regulation. Should regulation be of prime concern, rather than efficiency, then a large zener with a greater ΔI would be the proper choice.

DESIGN PROCEDURE:

Consider the circuit in fig. 10-2. It will be used to develop the design procedure for a zener in a circuit where V and R_L are variable.

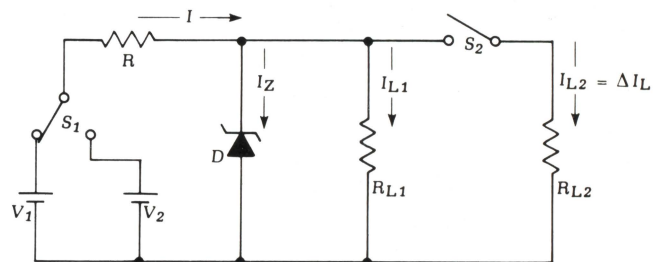


Fig. 10-2: A zener diode in a circuit with a varying load and a varying source.

STEP 1: Determine I_Z at the selected operating point.

$$I_Z = \frac{1}{2}\Delta I_Z + I_{ZT} + \frac{1}{2}\Delta I_L$$

The above will bias the zener at a point $\frac{1}{2}\Delta I_L$ above the ideal operating point. (Refer to fig. 10-3.)

STEP 2: Find R .

$$R = \frac{V_{(ref)} - V_Z}{I_{L1} + I_Z}$$

STEP 3: Determine the lowest value of V , $V_{(min)}$, with which the circuit will operate ($V_2 < V_1$).

$$V_{(min)} = R(I_{L1} + I_{L2} + I_{ZT}) + V_Z$$

STEP 4: Determine the highest value of V , $V_{(max)}$, with which the circuit will operate ($V_2 > V_1$).

$$V_{(max)} = R(I_{L1} + I_{ZM}) + V_Z$$

DESIGN EXAMPLE:

Refer to the circuit in fig. 10-2. Assume the following values: $V_1 = 12V$ with $1V_{p-p}$ of ripple, $I_{L1} = 20ma$, $I_{L2} = 10ma$ and the zener is a 1N752.

STEP 1: Determine I_Z at the selected operating point.

$$I_Z = \frac{1}{2}\Delta I_Z + I_{ZT} + \frac{1}{2}\Delta I_L$$

$$\begin{aligned} I_Z &= \frac{1}{2}(45ma) + 20ma + \frac{1}{2}(10ma) \\ &= 47.5ma \end{aligned}$$

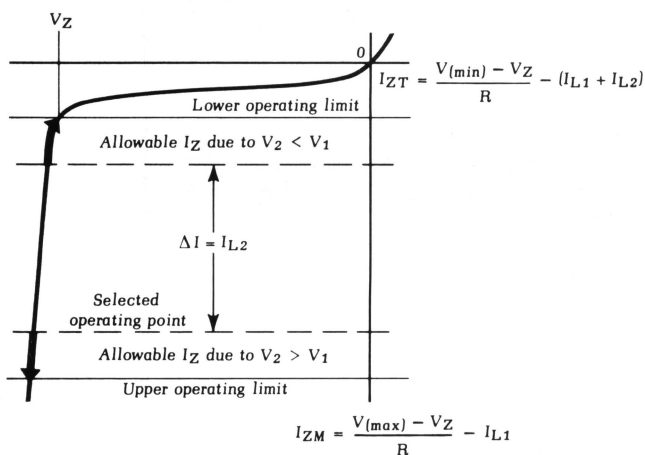


Fig. 10-3: A graphical presentation of a zener diode properly biased in a circuit having a varying source and a varying load.

STEP 2: Find R.

$$R = \frac{V(\text{ref}) - V_Z}{I_{L1} + I_Z}$$

$$= \frac{12 - 5.6V}{20\text{ma} + 47.5\text{ma}}$$

$$= 95 \Omega$$

Choosing the nearest higher standard value resistor, R becomes 100Ω. The choice of the higher value was based on safety. However, after Steps 3 and 4 the designer may decide on the next lower value (91 Ω).

STEP 3: Determine the lowest value of V, V_(min), with which the circuit will operate.

$$V(\text{min}) = R(I_{L1} + I_{L2} + I_{ZT}) + V_Z$$

$$= 100 \Omega (20\text{ma} + 10\text{ma} + 20\text{ma}) + 5.6V$$

$$= 10.6V$$

Since there is 1V_{p-p} of ripple, the actual V_(min) is 12V - 0.5V = 11.5V, and the condition

$$V(\text{min}) < \text{actual } V(\text{min})$$

$$10.6V < 11.5V$$

has been satisfied.

STEP 4: Determine the highest value of V, V_(max), with which the circuit will operate.

$$V(\text{max}) = R(I_{L1} + I_{ZM}) + V_Z$$

$$= 100 \Omega (20\text{ma} + 65\text{ma}) + 5.6V$$

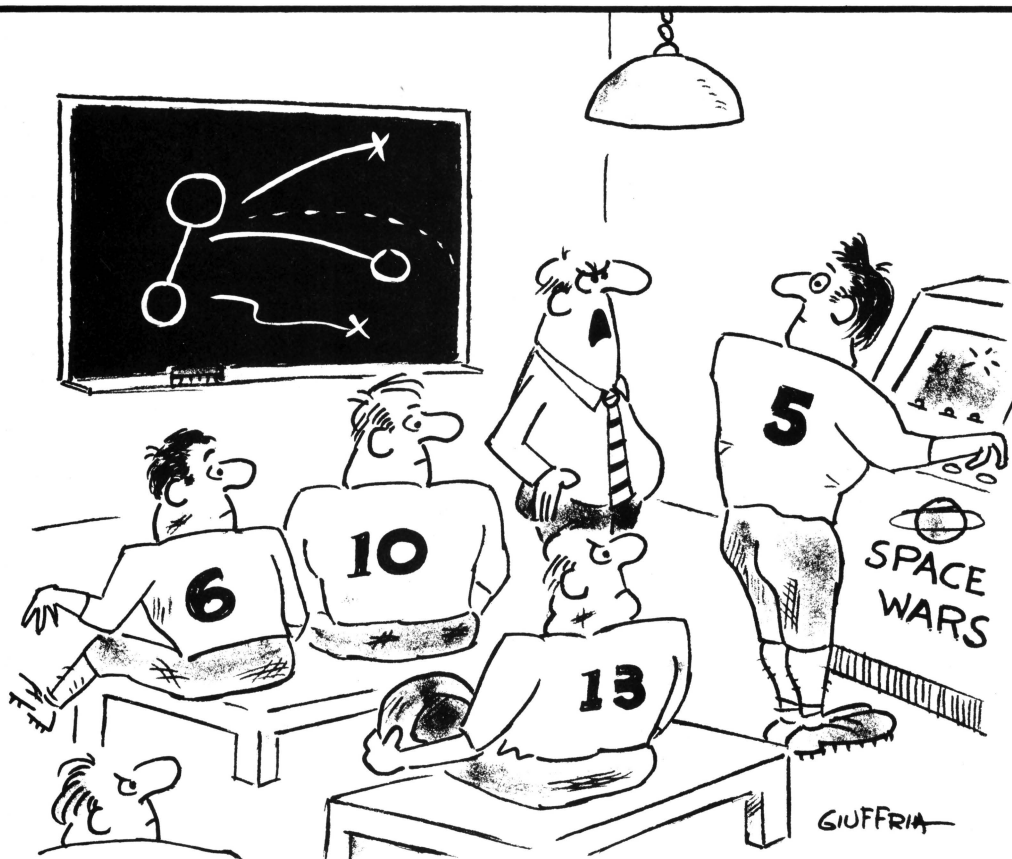
$$= 14.1V$$

The actual V_(max) will be 12V + 0.5V = 12.5V. The condition

$$V(\text{max}) > \text{actual } V(\text{max})$$

$$14.1V > 12.5V$$

has been satisfied.



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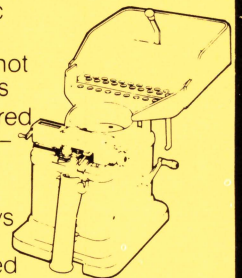
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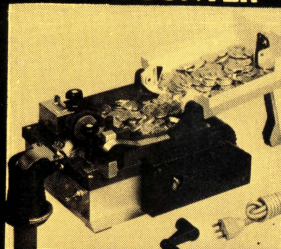
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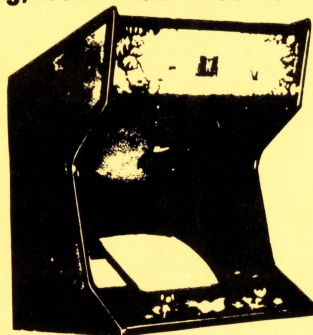
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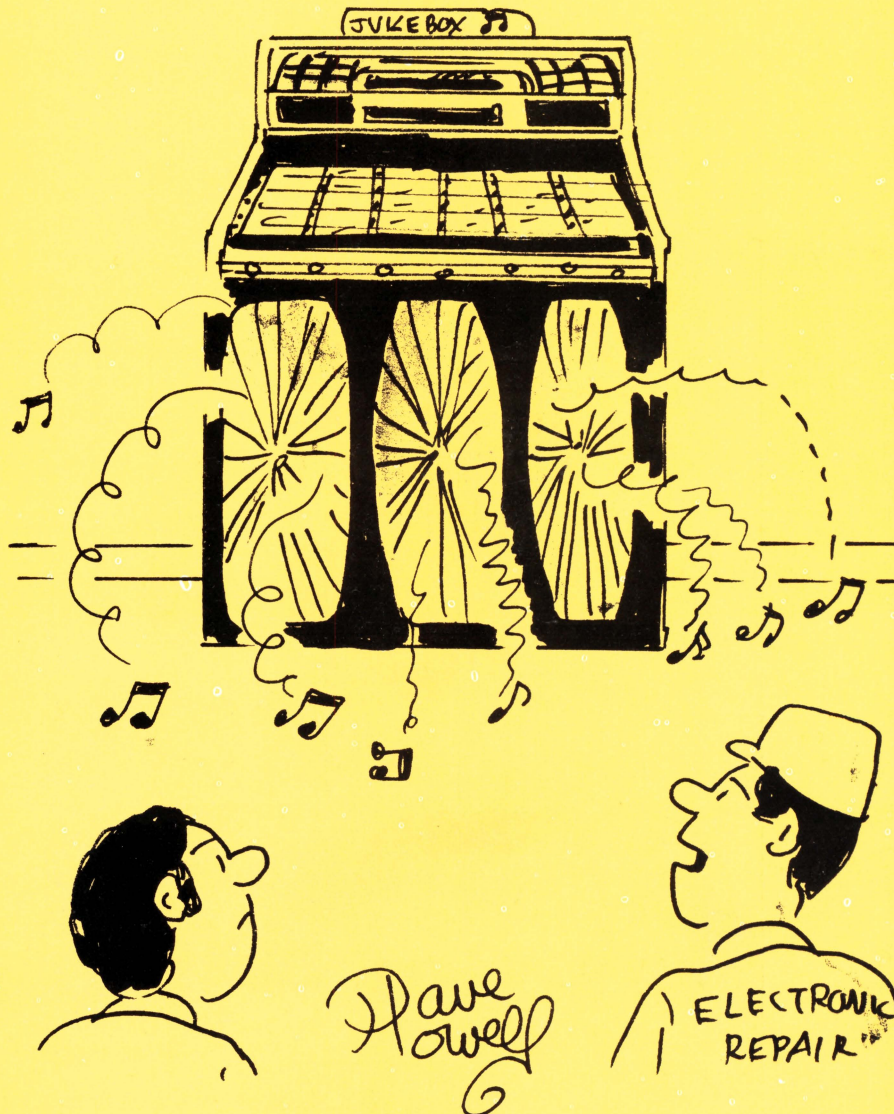
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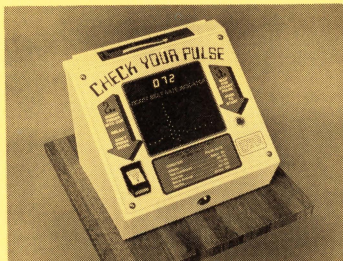
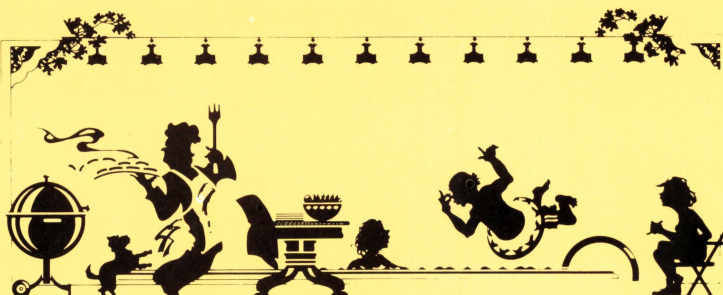
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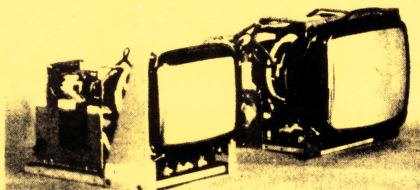
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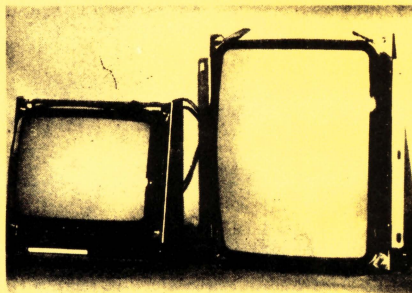
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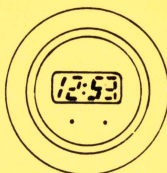
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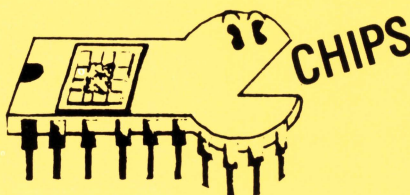
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NEWS BRIEFS

By Dawn Adorno

Bensar Co. Inc. of New Richmond, Ohio, distributor and jobber, closed its doors June 15. Bensar President Clifford Rydell was unavailable for comment.....

Sega's Astron Belt has become the top game in Japan, according to the Amusement Press. The game was released in Japan and is being readied for the American market. Namco's Pole Position has dropped to Number Two on the poll.....

The U.S. District Court of Providence, Rhode Island, issued a temporary restraining order in May on Eagle Conversions (also known as Glak). The order enjoins Eagle from the sale, distribution, and operation of Mr. Do! conversion kits, dedicated games, and all Mr. Do! graphic material, i.e., title header, monitor marquis, control panels, and cabinet side graphics.....

Fewer jukeboxes were licensed this year in Ohio, according to Ohio's Copyright Office's Licensing Division. While 181 operators licensed 9,172 jukeboxes in 1982, only 115 operators registered 6,939 jukeboxes in 1983. The Ohio Music and Amusement Association said that a "confiscatory assessment is causing the demise" of jukeboxes.....

Inn-Room Video Games Inc., a California firm, has put video game consoles in rooms in 15 hotels nationwide. The system is leased to the hotels which then rent game cartridges to guests, generally for \$5 per day.....

While most video game companies are coping with financial setbacks, home game producer Coleco Industries Inc. announced its first quarter profits and sales have more than tripled since the first quarter last year. First quarter earnings in 1983 were \$16.2 million or \$1.01 per share. This compares with 1982 first quarter earnings of \$4.5 million or 29 cents a share.....

Citizens in Shreveport, Louisiana, helped defeat a proposed ordinance to ban children 17 and under from playing video games during school hours. Area residents called the proposal unnecessary and unenforceable. Harold Rossbottom, owner of Automatic Amusement and Games, pointed out that a Louisiana state law allows children 16 and older to decide whether they want to attend school.....

International Game Technology has been named exclusive worldwide distributor of Fun Casino, a coin-op game designed and manufactured by Status Game Corporation. The game concept offers several games programmed into one unit and was designed to allow for future conversions as new programs are developed.....

NEWS BRIEFS (continued)

The Amusement and Vending Machine Distributors Association voted to cooperate with the Amusement Games Manufacturers Association in planning its 1984 industry exhibition at AVMDA's board of directors' meeting in June. Ed Doris, AVMDA's president, said the distributors would aid the manufacturers in finding appropriate speakers for the show's seminars.....

Business community members in Ottumwa, Iowa, are considering opening the "Official Video Game Hall of Fame" and the world's first video game collectors store.....

"Monitor," a bimonthly service newsletter from Bally/Midway is sent free of charge to operators. According to company officials, "Monitor" is service oriented and includes information on new games, service bulletins, and Bally's promotional efforts. To receive "Monitor," write to Kathy Sladek, John Iltis Associates, 233 E. Erie, Suite 200, Chicago, IL 60611. Telephone: 312/337-6012.....

Greater Southern Distributing Co. Inc. of Atlanta is providing video games for a summer series on Atlanta's WETV. The games will be used to attract the younger viewers' attention to a third grade mathematics series.....

Results from an exhibitor survey taken at the fourth annual IMA International Amusement and Vending Machine Trade Fair in Frankfurt, West Germany, show that 94 percent of 111 exhibiting companies from 10 nations acquired new business contacts at the show. The survey also indicated that 84 percent of the exhibitors at the January show received direct orders for service and music and amusement machines. IMA will stage its next three-day show January 19-21, 1984, in Frankfurt.....

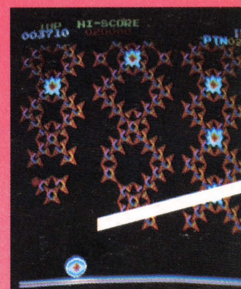
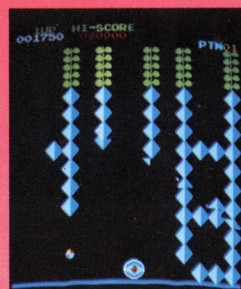
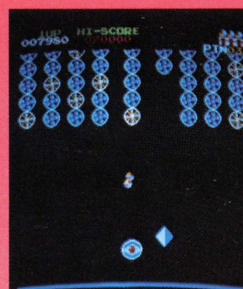
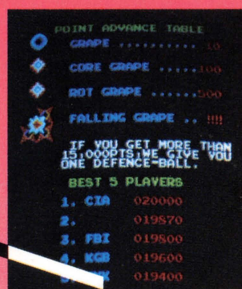
Barrie Sullivan has joined Atari's stateside headquarters as vice president of operations. Sullivan is a former director of MAM Inn Play and was in charge of the company's northern operation based in Leeds, England.....

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Jobbers vs. Distributors
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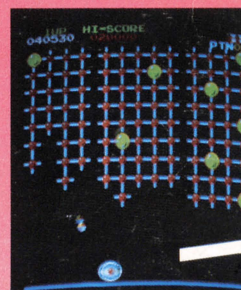
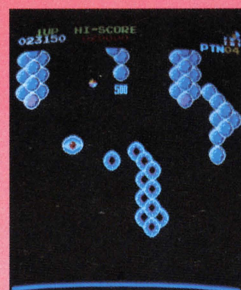
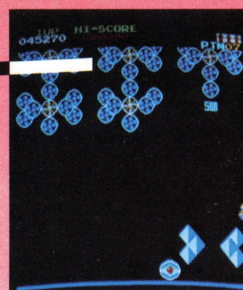
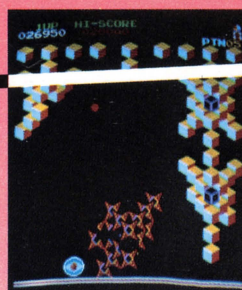
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